SOFTWARE VERSION 3.1

WWW.PRG.COM

PRG SERIES 400® POWER & DATA DISTRIBUTION SYSTEM

USER MANUAL

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PRG Series 400® Power and Data Distribution System User Manual

Version as of: July 6, 2012

PRG part number: 02.9680.0001.31

Production Resource Group, LLC
Dallas Office
8617 Ambassador Row, Suite 120
Dallas, Texas 75247
www.prg.com

PRG Series 400® Power and Data Distribution System User Manual
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FOREWORD

Safety Notice

It is extremely important to read ALL safety information and instructions provided in this manual and any accompanying documentation before installing and operating the products described herein. Heed all cautions and warnings during installation and use of this product.

Safety symbols used throughout this manual are as follows:

CAUTION advising of potential damage to product.

WARNING advising of potential injury or death to persons.

WARNING: INSTRUCTIONS FOR CONTINUED PROTECTION AGAINST ELECTRICAL SHOCK

1) This equipment is designed for dry locations only. Exposure to rain or moisture may damage the equipment and/or cause injury to persons.
2) Ensure house service mains breaker and rack Master Switch are OFF before connecting mains power cables to rack.
3) Follow mains power cable Cam-Lok connection order as specified on rack and in this manual.
4) Disconnect power before servicing.
5) Servicing to be performed by qualified PRG personnel only.

WARNING: RF INTERFERENCE

1) This is a Class A product. In a domestic environment this product may cause radio interference, in which case, the user may be required to take adequate measures.

Revision History

This manual has been revised as follows:

Version	Release Date	Notes
BASIC	April 28, 2006	Initial Release
A	May 30, 2006	Updated Rack Configuration drawing p.18. Added “Software Upgrades” p.39.
B	May 13, 2008	Updated “Additional Documentation” section on p. 1. Incorporated Series 400 400 Amp Disconnect information and warnings. Incorporated Series 400 10-Port and 7-Port Ethernet Switch descriptions, features and installation information.
C.1	February 3, 2010	Updated for software version 3.0. Added menu instructions for: Universal Un-switched DMX Input, DMX Merge, Source-Assignable Art-Net Input, Network Info, Ethernet Test, and Load Software from Rack. Added references to S400Tools Utility application.
C.2	October 14, 2010	Updated book format. (No changes to technical information.)
D	July 6, 2012	Added Soca Output Breaker Module and Trunk DC Adapter information. Added ecode part numbers to Overview.

TABLE OF CONTENTS

Introduction

About This Manual 1
Additional Documentation 1
Customer Service 2

Chapter 1. Overview

Description

Overview 4
Features Overview 7
Features By Component 8
Accessories 12

Controls and Indicators

Series 400 Rack 13
Breaker Module 15
Soca Output Breaker Module 16
Breakout Box 17
Front of House Breakout Module 18
Front of House Breaker Module 19
Front of House Trunk DC Adapter 19
Front of House A/B Switch 20
10-Port Ethernet Switch 21
7-Port Ethernet Switch 22

Theory of Operation

Rack System 23

Chapter 2. Installation

System Installation and Power Up

Load Distribution 26
Component and Power Connections 27
Installing an Ethernet Switch 29
Power Up Sequence 31
Breakout Box Mounting Options 33

Power Down

Power Down Sequence 35

Chapter 3. Operation

System Support

Multiple DMX512 Input Sources 38

Menu Display Features

Overview 39
Menu Structure 40

Menu Details 41
Input/Output Summary – Rack Module 41
Input/Output Summary – Front of House Module 41
Configure Inputs – Rack Module 41
Configure Inputs – Front of House 41
Configure Outputs – Rack Module 43
Configure Outputs – Front of House Module 43
Source Selection 43
System Overview 43
System: Universes 44
System: Rack Modules 44
System: FOH 44
Setup 1 and 2 45
Network Info 46
DMX Monitor 46
Software Info 47
Ethernet Tests 48

Software Upgrades

Installing a New S400 Software Version 49

Chapter 4. Troubleshooting & Maintenance

Troubleshooting

Basic Troubleshooting Guide 52

Routine Maintenance

Cleaning/Replacing Air Filters 53
Rack Filter 53
Breaker Module Filter 54

Reconfiguring Components

About Reconfiguring 55
Swapping a Breaker Module 55
Repositioning Front of House Trunk Connector 56
Installing Safety Cover Plates 57

INTRODUCTION

About This Manual

This manual provides necessary information regarding product safety, installation, and operation for the following PRG equipment:

+ PRG Series 400® Power and Data Distribution System - 120/208V Model (U.S. / Canada)

This manual applies to S400 software version 3.1.

Familiarizing yourself with this information will help you get the most out of your PRG product.

WARNING: It is important to read ALL accompanying safety and installation instructions to avoid damage to the product and potential injury to yourself or others.

Additional Documentation

For more information on PRG Series 400® components and systems, refer to the following PRG manuals:

+ PRG Series 400® 400 Amp Disconnect User Manual (02.9680.0200)
+ PRG Series 400® Ethernet Switch User Manual (02.9801.0001)
+ Virtuoso® Node Plus User Manual (02.9801.0301)
+ Virtuoso® Node User Manual (02.9669.0001)
+ PRG Lighting Systems Networking Guide (02.3004.1000.0)
+ S400Tools Utility User Manual (02.9680.0020.10)
  (S400Tools Utility is an offline application used for remote control, configuration, and monitoring of Series 400 systems.)

For extended service information, refer to the following PRG manual:

+ PRG Series 400® Power and Data Distribution System Service Manual (02.9680.0010)

For more information regarding DMX512 systems, refer to the DMX512/1990 & AMX 192 Standards publication available from United States Institute for Theatre Technology, Inc. (USITT).

USITT
6443 Ridings Road
Syracuse, NY 13206-1111 USA
1-800-93USITT
www.usitt.org

For more information regarding Art-Net protocol, refer to the specification for Art-Net II Ethernet Communication Standard available from Artistic Licence Ltd.

Artistic Licence (UK) Ltd (Registered Office)
24 Forward Drive, Christchurch Avenue,
Harrow, Middlesex, HA3 8NT, United Kingdom
+44 (0)20 88 63 45 15
www.artisticlicence.com

Customer Service

For technical assistance, contact the PRG International Service Center or contact your nearest PRG office. Contact information for all PRG office locations can be found on our website at: www.prg.com/about-us/locations/

PRG Dallas (International Service)

8617 Ambassador Row, Suite 120
Dallas, Texas 75247 USA
Phone: 214.630.1963
Fax: 214.630.5867
Service Fax: 214.638.2125
Service Email: orders@prg.com

For additional resources and documentation, please visit our website at: www.prg.com

1.

OVERVIEW

This chapter provides an overview of product features, components, and system configurations.

+ DESCRIPTION
+ CONTROLS AND INDICATORS
+ THEORY OF OPERATION

DESCRIPTION

Overview

The standard V676 Console consists of a Rolling Rack unit, up to six 3U Breaker Modules, and associated Breakout Boxes connected by Trunk Cables. The rack is designed to distribute house power service and control signals for the purpose of operating automated luminaires or other remote devices up to 500 feet away.

Optional components include the Front of House (FOH) Breaker and Breakout Modules, which provides a convenient method of connecting consoles and accessories at the mix riser position. The FOH Breaker Module sources two sets of six 15-Amp circuits of AC line power and provides system control data inputs for up to 10 USITT DMX512 universes along with inputs for two 10/100BaseT Ethernet signals at the associated FOH Breakout Module.

The FOH A/B Switch is connected to the FOH Breakout Module and can be used to input and track multiple DMX512 universes. The Trunk DC Adapter can be used to power the internal circuit boards in all versions of the FOH Breakout Modules. This will enable multiple DMX512 Universes to be converted to Ethernet outputs.

Note: Refer to "Controls and Indicators" on page 13 for more specifics on component operation.

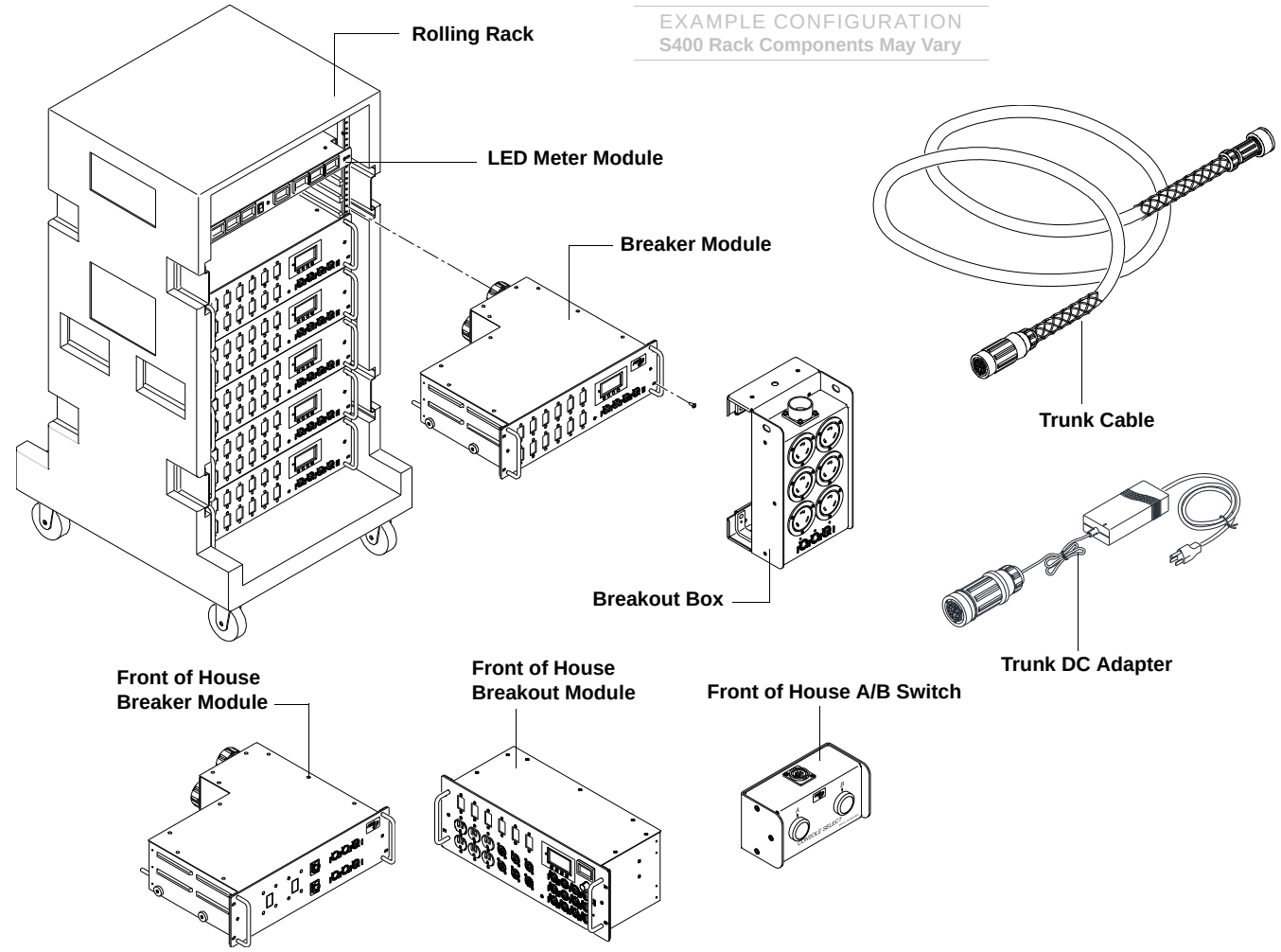


Figure 1-1: Series 400 Rack Components Overview

Depending on the application, there are several model types available for Series 400 Breaker Modules and Breakout Boxes. Models are as follows:

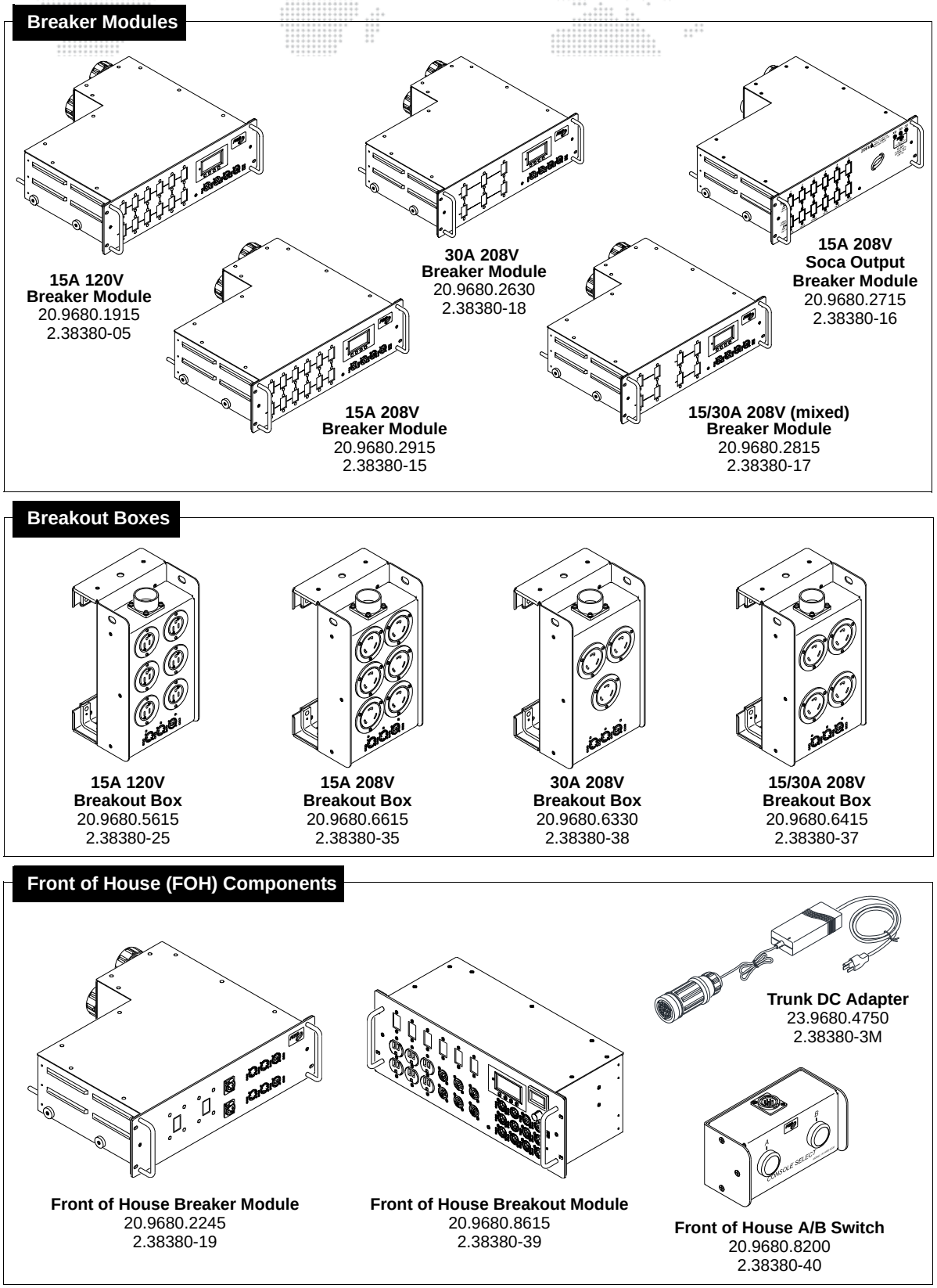


Figure 1-2: Series 400 Component Models

Several types of data distribution devices are available for expansion of the Series 400 System.

Ethernet Switches

The Series 400 Ethernet Switches provide a powerful and convenient interface between Virtuoso® or DMX512 control consoles and their control equipment. For complete installation and operation instructions, refer to the following manual:

+ Series 400 Ethernet Switch User Manual (02.9801.0001).

Nodes

The Virtuoso® Node units provide a powerful and convenient interface between Virtuoso or Art-Net compatible control consoles, pixel mapping from media servers, and subsequent control equipment which require either Art-Net (Virtuoso Node Plus only) or DMX512 control signals (Virtuoso Node Plus and Virtuoso Node). For complete installation and operation instructions, refer to the following manuals:

+ Virtuoso® Node Plus User Manual (02.9801.0301)
+ Virtuoso® Node User Manual (02.9669.0001)

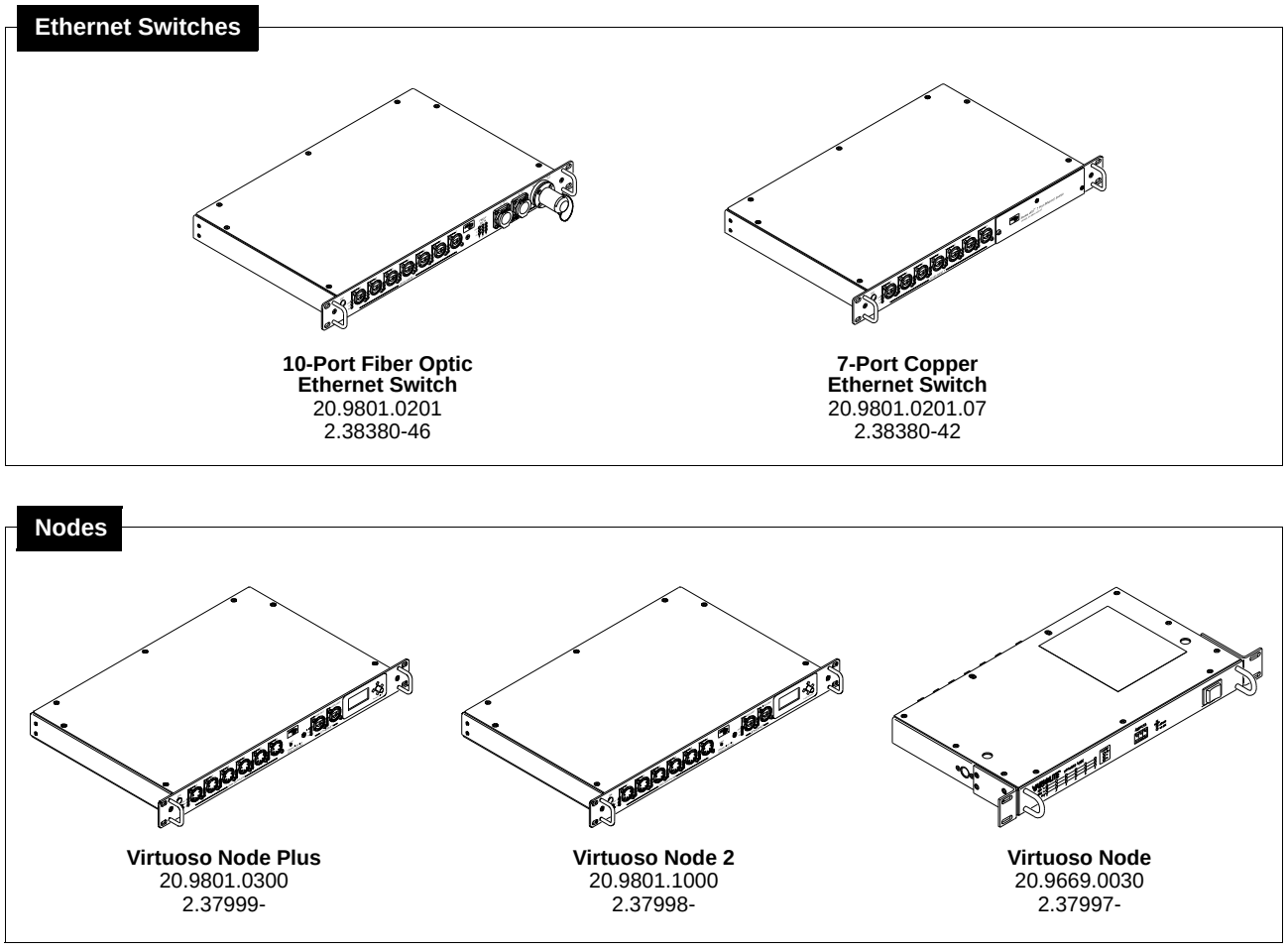


Figure 1-3: Switches and Nodes

Features Overview

The Series 400 System offers a significant amount of features, both standard and superior to other power distribution systems.

Features Summary

+ Supports up to 72, 1.2k Watt Devices
+ Single, Dual, and 3-Phase Outputs
+ 400 Amp Cam-Loks In and Out
+ 120V and 208V Outputs
+ Digital Current and Voltage Metering
+ Safety Interlock with Breakout Boxes
+ System Master Switch
+ Front Panel Flush Rocker Circuit Breakers
+ Hot-Swappable Breaker Modules
+ 10/100BaseT Ethernet and DMX512 Inputs
+ DMX Merging
+ Signal Routing Control and Display
+ Rear 120V Convenience Outlets
+ L6-20 and Neutrik® 208V Outputs
+ Front and Back LED Lighting
+ 3U of additional rack space for adding third-party signal processing devices
+ Cable Testing Capabilities
+ Modular Design
+ Weighs a maximum of 305 lbs. when fully loaded.
+ Remote control, configuration, and monitoring of the system from a computer using the S400Tools software application.

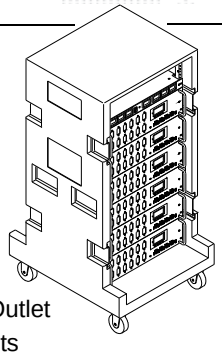
Safety Features

The Series 400 System provides a greater level of safety than other power distribution systems.

+ The number of internal current carrying connections is minimized. The Series 400 design uses far fewer screws, clamps, and crimps which can heat and work loose over time. The few connections that remain are secured with locking hardware.
+ Solid copper rigid bus bars replace much of the internal wiring, eliminating flex failures and soft crimp connections, which are responsible for most electrical fires. Rigid buses replace most flexible high current wiring, providing solid, low-loss connections between components.
+ A simple interlock system applies power to the branch circuits only when a compatible Breaker Module and Breakout Box are connected by a Trunk Cable. Additionally, the interlock system applies power only after ALL connections are made, protecting stage workers from shock during installation.

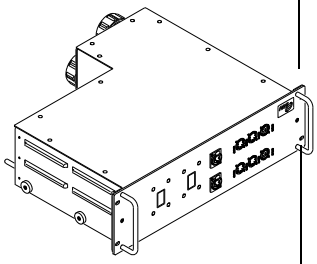
Features By Component

Rolling Rack Unit



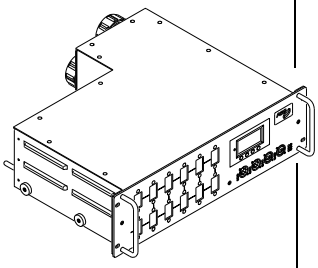
- Supports up to 72, 1.2k Watt Devices
- Neon Phase Indicators
- System Master Switch
- Two 120V Convenience Outlets
- 400A Cam-Loks In & Out
- One L6-20 208V Power Outlet
- Two Neutrik® 208V Outlets
- Digital Current & Voltage Metering
- Front & Back LED Lighting
- Test Point Jacks

Front of House Breaker Module



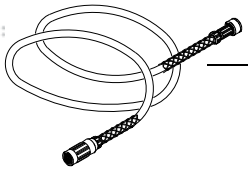
- Two Intercom Inputs
- Two 100BaseT Ethernet Output
- Four DMX512 Outputs
- Front Panel Flush Rocker Circuit Breakers
- Hot-Swapping Capability
- Safety Interlock with FOH Breakout Modules

15A 120V Breaker Module



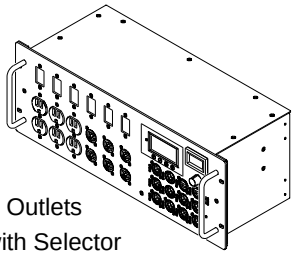
- Twelve 15A 120V Outputs
- Two DMX512 Inputs
- Two 100BaseT Ethernet Inputs
- Signal Routing Control and Display
- Front Panel Flush Rocker Circuit Breakers
- Hot-Swapping Capability
- Safety Interlock with Breakout Boxes

Trunk Cable



- Works with All Module Types
- 12 AWG Power Conductors
- Redundant Ground Circuits
- Integrated Ethernet Cable
- Proven Industrial Connector & Envirotec Shell
- 7-Year Lifetime Construction
- Connects up to 500’ of Cable

Front of House Breakout Module

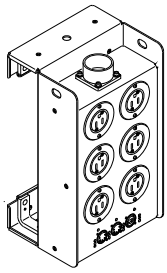


- Ten standard DMX512 Inputs
- Two 100BaseT Ethernet Inputs
- Six Edison Style 120V Outlets
- Six Neutrik® 208V Outlets
- Digital Voltmeter with Selector Switch
- Signal Routing Control and Display
- Front Panel Flush Rocker Circuit Breakers
- Safety Interlock with FOH Breaker Module

Front of House A/B Switch

- XLR Output for Connection to FOH Breakout Module
- Two Lighted Source Selector Switches

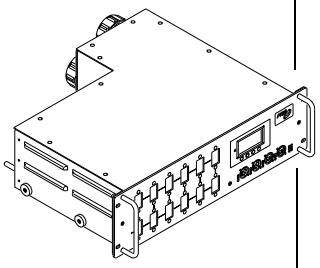
15A 120V Breakout Box



- Power and Signal for up to Six Devices
- Six 5-15 Output Connectors
- DMX512 and 100BaseT Ethernet Outputs
- Compact Package for Truss Mounting
- Rugged Construction
- Safety Interlock with Breaker Modules

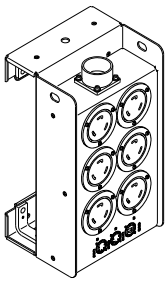
Figure 1-4: Features By Component (Part 1)

15A 208V Breaker Module



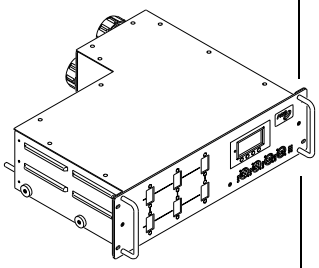
- Twelve 15A 208V Outputs
- Two DMX512 Inputs
- Two 100BaseT Ethernet Inputs
- Signal Routing Control and Display
- Front Panel Flush Rocker Circuit Breakers
- Hot-Swapping Capability
- Safety Interlock with Breakout Boxes

15A 208V Breakout Box



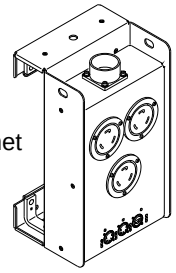
- Power and Signal for up to Six Devices
- Six L6-20 Output Connectors
- DMX512 and 100BaseT Ethernet Outputs
- Compact Package for Truss Mounting
- Rugged Construction
- Safety Interlock with Breaker Modules

30A 208V Breaker Module



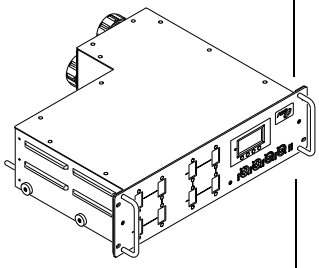
- Six 208V Outputs
- Two DMX512 Inputs
- Two 100BaseT Ethernet Inputs
- Signal Routing Control and Display
- Front Panel Flush Rocker Circuit Breakers
- Hot-Swapping Capability
- Safety Interlock with Breakout Boxes

30A 208V Breakout Box



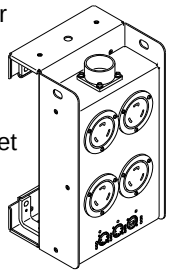
- Power and Signal for up to Three Devices
- Three L6-30 Output Connectors
- DMX512 and 100BaseT Ethernet Outputs
- Compact Package for Truss Mounting
- Rugged Construction
- Safety Interlock with Breaker Modules

15/30A 208V Breaker Module



- Four 15A 208V Outputs
- Four 30A 208V Outputs
- Two DMX512 Inputs
- Two 100BaseT Ethernet Inputs
- Signal Routing Control and Display
- Front Panel Flush Rocker Circuit Breakers
- Hot-Swapping Capability
- Safety Interlock with Breakout Boxes

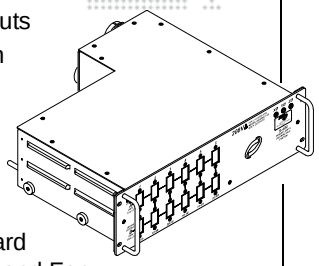
15/30A 208V Breakout Box



- Power and Signal for up to Four Devices
- Two L6-20 and Two L6-30 Output Connectors
- DMX512 and 100BaseT Ethernet Outputs
- Compact Package for Truss Mounting
- Rugged Construction
- Safety Interlock with Breaker Modules

Figure 1-5: Features By Component (Part 2)

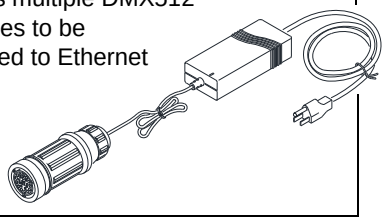
15A 208V Soca Output Breaker Module



- Twelve 15A 208V Outputs
- Two VEAM VSC 19-Pin Connectors
- 15A Long-Time Delay Trip Curve Circuit Breakers designed to handle Strobes
- Compatible with Standard Socapex Trunk Cables and Fan-Outs
- Neon Power Indicators for each of Three Phases
- Master Switch Controls Contactors
- Front Panel Flush Rocker Circuit Breakers
- Hot-Swapping Capability

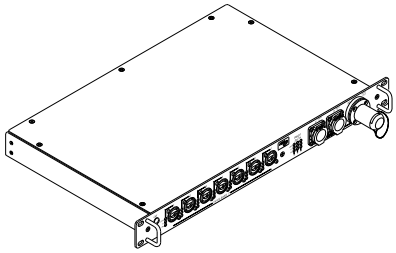
Front of House Trunk DC Adapter

- Used in place of standard Trunk Cable to power internal circuit boards in all versions of S400 Front of House Breakout Modules
- Enables multiple DMX512 Universes to be converted to Ethernet outputs



10-Port Ethernet Switch

- Seven isolated copper Ethernet ports for input of 10Base-T and 100Base-TX standard signal (Neutrik® EtherCon® connectors).
- Three fiber optic Ethernet ports for transmission of 100Base-FX standard signal. Two ports allow use of the Virtuoso Fiber Optic Cable input connector and one port allows use of the Virtuoso® Fiber Optic Cable output connector.
- Automatic detection and configuration of input signal speed.
- Link, Transmission, and Reception status LEDs for all ports.
- Neutrik® PowerCon® connector for input AC supply (90-240V).
- DC power status LED.
- Standard 1U 19" rack mount chassis.



7-Port Ethernet Switch

- Seven isolated copper Ethernet ports for input of 10Base-T and 100Base-TX standard signal (Neutrik® EtherCon® connectors).
- Automatic detection and configuration of input signal speed.
- Link, Transmission, and Reception status LEDs for all ports.
- Neutrik® PowerCon® connector for input AC supply (90-240V).
- DC power status LED.
- Standard 1U 19" rack mount chassis.

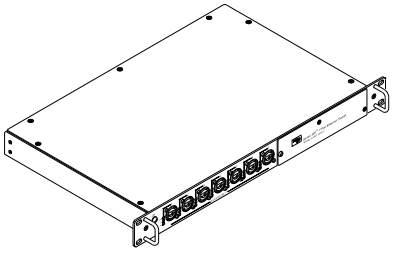
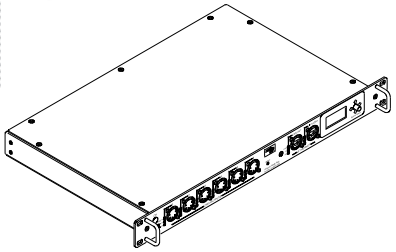


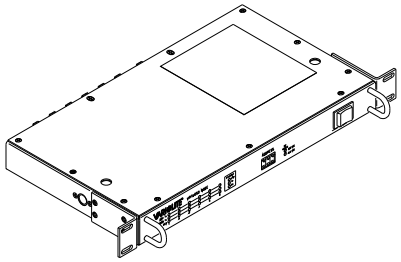
Figure 1-6: Features By Component (Part 3)

Virtuoso Node Plus



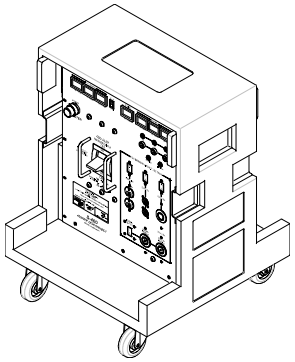
- Accepts both Virtuoso and Art-Net control protocols.
- Compatible with 10Base-T or 100Base-TX standard signals.
- Automatic detection and mode configuration according to input signal type.
- One Ethernet (Art-Net) output port supporting up to six DMX512 universes.
- Six DMX512 serial output ports supporting one DMX512 universe each.
- LEDs indicating Link, TX data, and RX data status for all Ethernet ports.
- LEDs indicating DMX Tx, RDM Tx, and RDM Rx data status for all DMX ports.
- Display support for configuration of Virtuoso address, configuration of Art-Net outputs in Series 400 Mode, real-time monitoring of DMX512 data on each output, display of network error information, and display of current software version.
- Neutrik® PowerCon® connector for input AC supply.
- Front panel DC power status LED.
- Standard 1U 19" rack mount chassis.

Virtuoso Node



- Accepts both Virtuoso and Art-Net control protocols.
- Compatible with 10Base-T or 100Base-TX standard signals.
- When used with consoles running Virtuoso SV 4.4 or greater, the operating mode is automatically configured according to the input signal type
- Six DMX512 serial output ports supporting one DMX512 universe each.
- Address thumbwheel for mapping a block of Art-Net universes to the six DMX512 outputs.
- LEDs indicating DMX Tx, RDM Tx, and RDM Rx data status for all DMX ports.
- Front panel DC power status LED.
- Standard 1U 19" rack mount chassis.

400 Amp Disconnect



- Six Cam-Lok Series E1016 high-current connections for power input.
- Two sets of six Cam-Lok Series E1016 high-current connections for power output.
- Double Neutral connectors to handle excessive neutral current generated by low power factor loads.
- Seven digital LED meters to monitor power flow - three voltmeters to measure phase voltages and four current meters to measure current flowing in each phase and the neutral.
- Neon indicators to show when feed cable is energized.
- Adjustable control for setting inrush limit.
- Five color coded, insulated test points for metering output voltages.
- Multiple local convenience outlets.
- Solid copper rigid bus bars and two thermostatically controlled cooling fans allow operation at 100% of Rated current.
- Suitable for use in the U.S. and Canada, or any locality with a 5-wire, 120/208V power grid.

Figure 1-7: Features By Component (Part 4)

Accessories

The following optional and/or replacement items can be ordered directly from PRG. (Please order by PRG part number.)

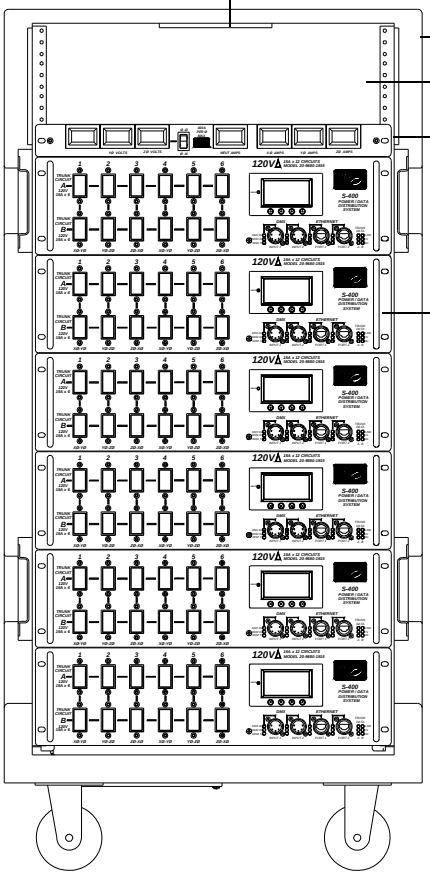
PRG P/N	TEAM eCode	Accessory
22.9620.0194	2.38380-75	Safety Cable Assembly
55.6841.0001	2.38380-72	Mega-Claw Truss Hook (for 2" Round Pipe)
21.9680.0661	-	1U Safety Cover Plate Assembly
21.9680.0662	-	2U Safety Cover Plate Assembly
21.9680.0660	-	3U Safety Cover Plate Assembly
25.9680.9001	2.38380-48	Ethernet Patch Cable, 1 Ft., Black Shark Fin
25.9680.9002	2.38380-49	Ethernet Patch Cable, 2 Ft., Black Shark Fin
Breakout Box Clamp Bracket Mounting Parts:		
22.9961.1636	-	Clamp Bracket (Rail)
10.9661.1249	-	Bushing
10.9679.1206	-	Nut
53.6653.0009	-	1/4-20 Screw

CONTROLS AND INDICATORS

Series 400 Rack

The PRG Series 400 Rack unit is the main power and data distribution hub for the system. The Rack houses up to six Breaker Modules of any type, which can include a Front of House Breaker Module. The Rack provides a built-in LED Meter Module that monitors system current and voltage, and additional space for installing optional expansion components such as Series 400 Ethernet Switches and/or Virtuoso® Nodes. System-wide functions can be controlled at the Rack, including power up, power down and testing.

The following illustrations provide a detailed description of standard rack connections, controls and indicators in an example configuration.



Front Rack Light - provides illumination for front side of rolling rack.

Rolling Rack - rugged rack enclosure unit, which provides 18U for installation of modular components.

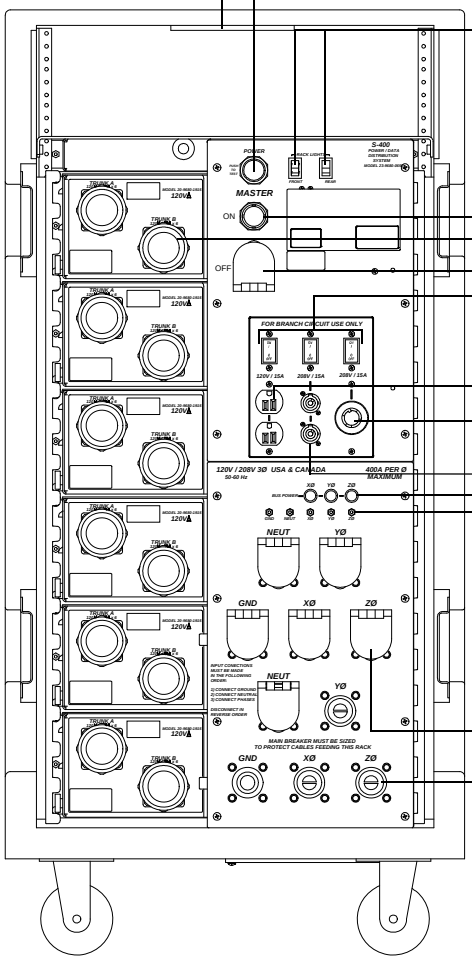
Additional Space - 3U of rack space for adding third-party signal processing devices.

LED Meter Module - provides both current and voltage metering utilizing seven digital LED displays.

3U Breaker Module (up to 6) - hot-swappable chassis module which supplies AC power to individually protected branch circuits via Trunk connectors (mounted on rear panel).

EXAMPLE CONFIGURATION
S400 Rack Components May Vary

Figure 1-8: Rack Components / Front View



Rear Rack Light - provides illumination for rear side of rolling rack.

Pilot Light - indicates when power is applied to rack system. Provides a Push-To-Test function.

Rack Light On/Off Switches - on/off switches for front and rear rack lights.

Master On Switch - powers up entire rack system.

Breaker Module (rear view) - provides Trunk Outputs A and B for distribution of power and data to Breakout Boxes.

Master Off Switch - safely powers down entire rack system.

15A Circuit Breakers - protects convenience outlets, Neutrik connectors and L6-20 connector.

Convenience Outlet (2) - Edison style receptacle, which provides power for optional work lights, test equipment, etc.

L6-20 Power Outlet - provides 208V power for a single fixture such as a VARI✳LITE® VL3000™ Spot Luminaire.

Neutrik® Power Outlet (2 pair) - provides power for control consoles and/or auxiliary signal processors.

Phase Indicators - neon indicators light when power is applied to rack input connectors.

Test Points - color coded test point jacks used to check rack voltages.

Output Power Connectors - 400 Amp Cam-Lok style connectors used for tapping power to another rack.

Input Power Connectors - 400 Amp Cam-Lok style connectors for input of house power service.

EXAMPLE CONFIGURATION
S400 Rack Components May Vary

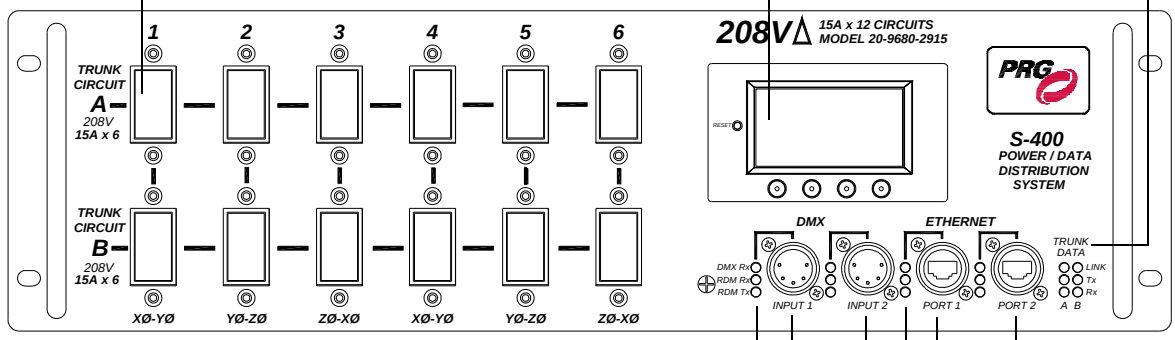
Figure 1-9: Rack Components / Rear View

Breaker Module

The Breaker Module provides two trunk outputs, with each circuit protected by an individual circuit breaker, for the purpose of routing power and control to the system. The total number of circuits depends on the model. The module accepts 100BaseT Ethernet and DMX512 inputs, and features a Menu Display which provides control and configuration of the signal routing to all connected Breakout components. The Breaker Module is installed directly into the Rack unit.

The following illustration provides a detailed description of Breaker Module connections, controls and indicators.

Note: The 15A 208V model is shown here, however, these components are typical of all Breaker Module models except the Soca Output Breaker Module (which is shown on the following page).



Circuit Breaker Switch (12) - provides individual protection for the connected luminaire.

Menu Display - used to configure, test, and access internal status information for the Series 400 Rack system using associated soft-programmable buttons.

Trunk LEDs (A & B) - indicates valid Trunk cable data link and data flow.

DMX LEDs - indicates valid DMX512 receive, RDM receive and transmit when lit.

DMX Input Connectors (1 & 2) - DMX512 in from console or controller.

Ethernet LEDs - indicates valid Ethernet link, transmit and receive when lit.

Ethernet Connectors (Ports 1 & 2) - allows Ethernet connection to system. Accepts standard Ethernet or Neutrik® EtherCon® connectors.

15A 208V MODEL SHOWN
Rack Components May Vary

Figure 1-10: Breaker Module Connections, Controls and Indicators

Model Configurations

Several Breaker Module configurations are available, based on power requirements:

+ 12-Channel 15A 120V Module
+ 12-Channel 15A 208V Module
+ 6-Channel 30A 208V Module
+ 8-Channel 15/30A 208V Module (mixed)

Soca Output Breaker Module

The Soca Output Breaker Module allows Socapex-compatible trunk cables and fan-outs to be used with the Series 400 system. The module provides twelve 15A outputs for two Socapex-compatible trunk cables (six circuits each). During operation, all trunk outputs will be on if the Rack Master Switch is enabled, since there are no key lines to disable the outputs.

Special Notes:

- Unlike other S400 Breaker Modules, the Soca Output Breaker Module does not have any displays, DMX or Ethernet connections since Socapex-compatible trunks do not contain data cables.
- No S400 Breakout Boxes are necessary with this unit.
- There are no key lines to distinguish 120V from 208V at the fan-outs.

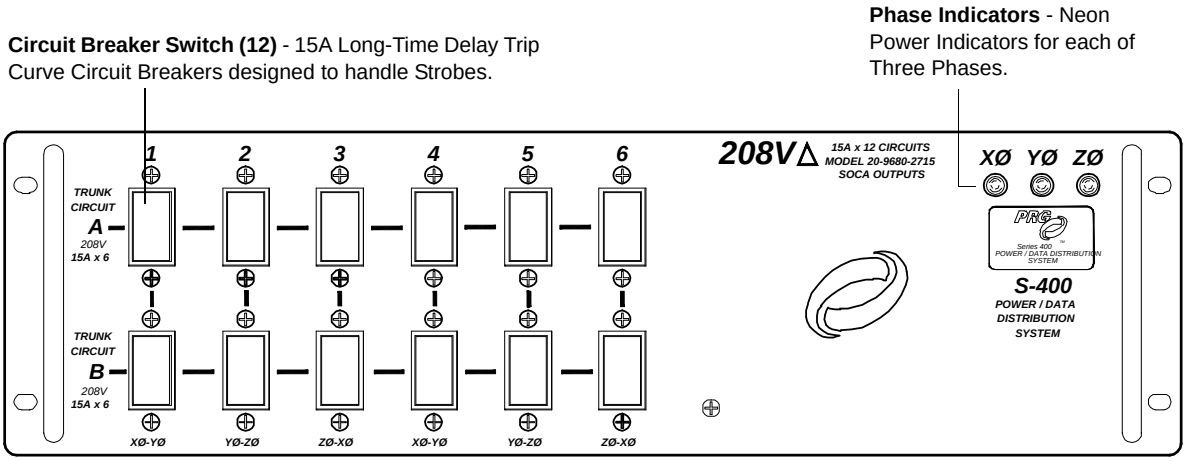


Figure 1-11: Soca Output Breaker Module Connections, Controls and Indicators

Breakout Box

The Breakout Box supplies power and control signal for three, four or six devices, depending on the model. LEDs provide verification of the power and data signals. The Breakout Box can be installed in a truss with a choice of several mounting hardware options, providing a convenient location for connecting system devices.

The following illustration provides a detailed description of the Breakout Box connections, indicators and mounting hardware options. (The 15A 208V model is shown here, however, these components are typical of all Breakout Box models.)

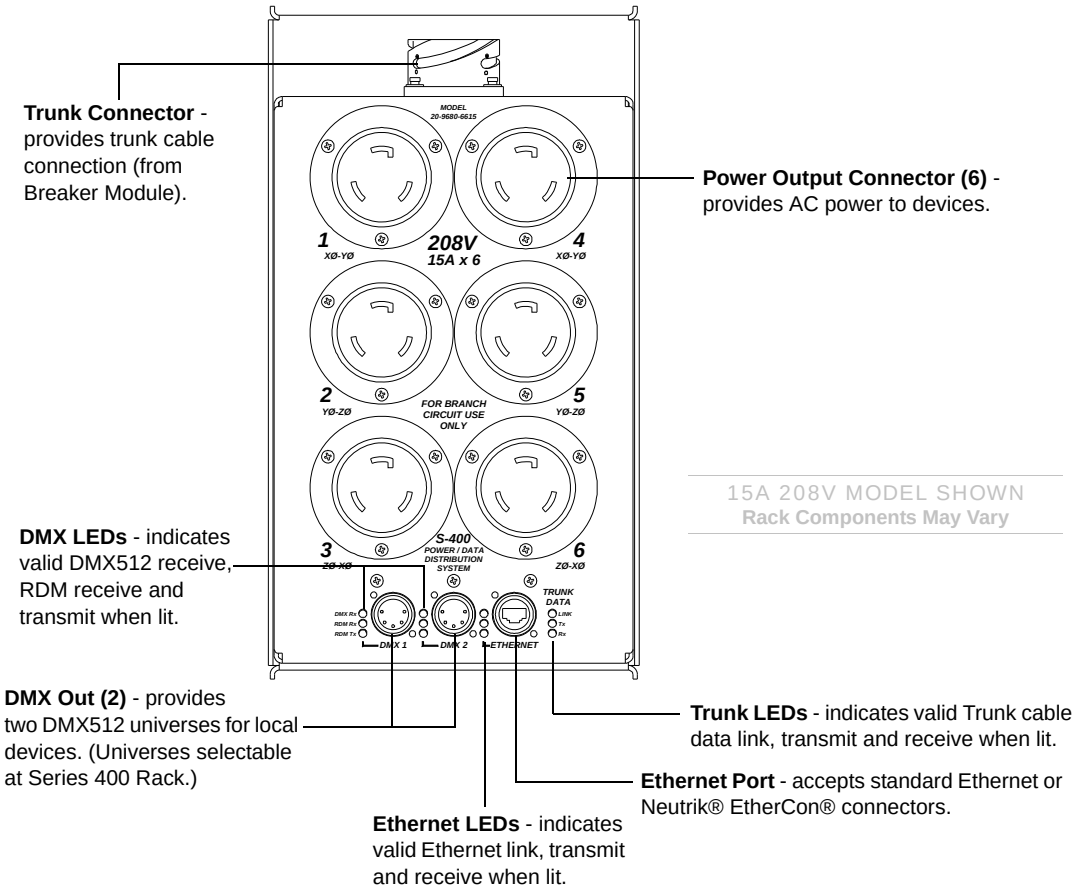

Trunk Connector - provides trunk cable connection (from Breaker Module).
Power Output Connector (6) - provides AC power to devices.
15A 208V MODEL SHOWN
Rack Components May Vary
DMX LEDs - indicates valid DMX512 receive, RDM receive and transmit when lit.
DMX Out (2) - provides two DMX512 universes for local devices. (Universes selectable at Series 400 Rack.)
Trunk LEDs - indicates valid Trunk cable data link, transmit and receive when lit.
Ethernet Port - accepts standard Ethernet or Neutrik® EtherCon® connectors.
Ethernet LEDs - indicates valid Ethernet link, transmit and receive when lit.
MODEL 20-9680-6615
1 XØ-YØ
208V 15A x 6
4 XØ-YØ
2 YØ-ZØ
FOR BRANCH CIRCUIT USE ONLY
5 YØ-ZØ
3 ZØ-XØ
S-400 POWER / DATA DISTRIBUTION SYSTEM
6 ZØ-XØ
TRUNK DATA
DMX 1
DMX 2
ETHERNET

Figure 1-12: Breakout Box Connections and Indicators

Model Configurations

Several Breakout Box configurations are available, based on power requirements:

+ 6-Channel 15A 120V Module
+ 6-Channel 15A 208V Module
+ 3-Channel 30A 208V Module
+ 4-Channel 15/30A 208V Module (mixed)

Front of House Breakout Module

The Front of House (FOH) Breakout Module provides a convenient method for connecting consoles and accessories at the mix riser position. It provides power outlets for up to 12 devices, each of which are protected by an individual circuit breaker. Using the FOH Breakout Module, both a primary and backup console can be connected to the system. The module provides 10 standard DMX512 inputs for inputting console data into the Ethernet stream and two Ethernet inputs for any Ethernet signal such as Art-Net or HOG® Ethernet. DMX512 universes can be selected and controlled using the built-in Menu Display.

The following illustration provides a detailed description of the Front of House (FOH) Breakout Module connections, controls and indicators.

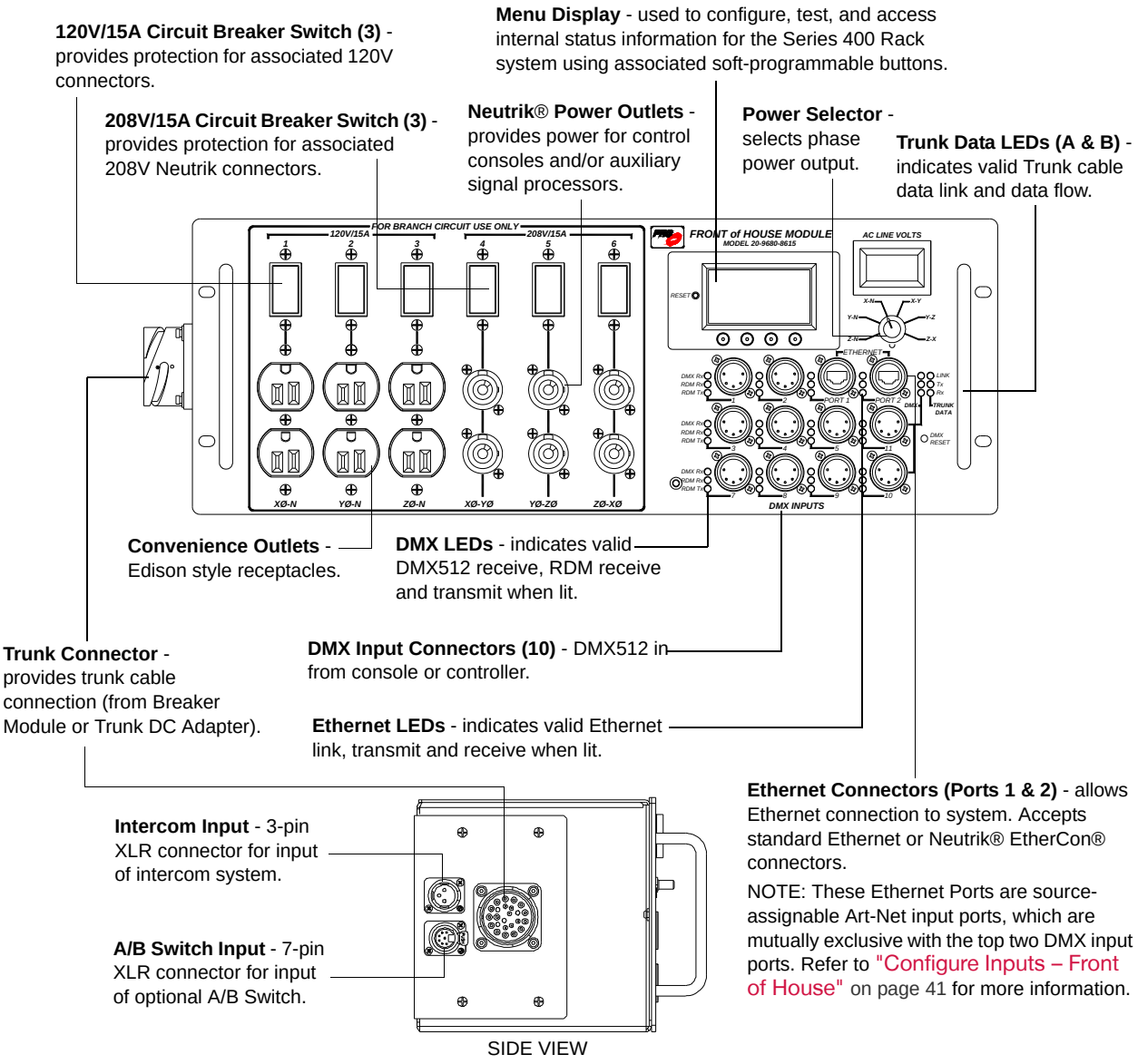

120V/15A Circuit Breaker Switch (3) - provides protection for associated 120V connectors.
208V/15A Circuit Breaker Switch (3) - provides protection for associated 208V Neutrik connectors.
Menu Display - used to configure, test, and access internal status information for the Series 400 Rack system using associated soft-programmable buttons.
Neutrik® Power Outlets - provides power for control consoles and/or auxiliary signal processors.
Power Selector - selects phase power output.
Trunk Data LEDs (A & B) - indicates valid Trunk cable data link and data flow.
FOR BRANCH CIRCUIT USE ONLY
120V/15A
208V/15A
FRONT of HOUSE MODULE
MODEL 20-9680-9615
AC LINE VOLTS
ETHERNET
DMX INPUTS
XØ-N
YØ-N
ZØ-N
XØ-YØ
YØ-ZØ
ZØ-XØ
Convenience Outlets - Edison style receptacles.
DMX LEDs - indicates valid DMX512 receive, RDM receive and transmit when lit.
Trunk Connector - provides trunk cable connection (from Breaker Module or Trunk DC Adapter).
DMX Input Connectors (10) - DMX512 in from console or controller.
Ethernet LEDs - indicates valid Ethernet link, transmit and receive when lit.
Intercom Input - 3-pin XLR connector for input of intercom system.
A/B Switch Input - 7-pin XLR connector for input of optional A/B Switch.
SIDE VIEW
Ethernet Connectors (Ports 1 & 2) - allows Ethernet connection to system. Accepts standard Ethernet or Neutrik® EtherCon® connectors.
NOTE: These Ethernet Ports are source-assignable Art-Net input ports, which are mutually exclusive with the top two DMX input ports. Refer to "Configure Inputs – Front of House" on page 41 for more information.

Figure 1-13: Front of House Breakout Module Connections, Controls and Indicators

Front of House Breaker Module

The Front of House (FOH) Breaker Module provides two trunk outputs, with each circuit protected by an individual circuit breaker, for the purpose of routing power and control to FOH Breakout Modules. Unlike the standard Breaker Modules, the FOH Breaker Module does not offer a Menu Display, which is instead located at the FOH Breakout Module itself. The FOH Breaker Module is installed directly into the Rack unit.

The following illustration provides a detailed description of the Front of House (FOH) Breaker Module connections, controls and indicators.

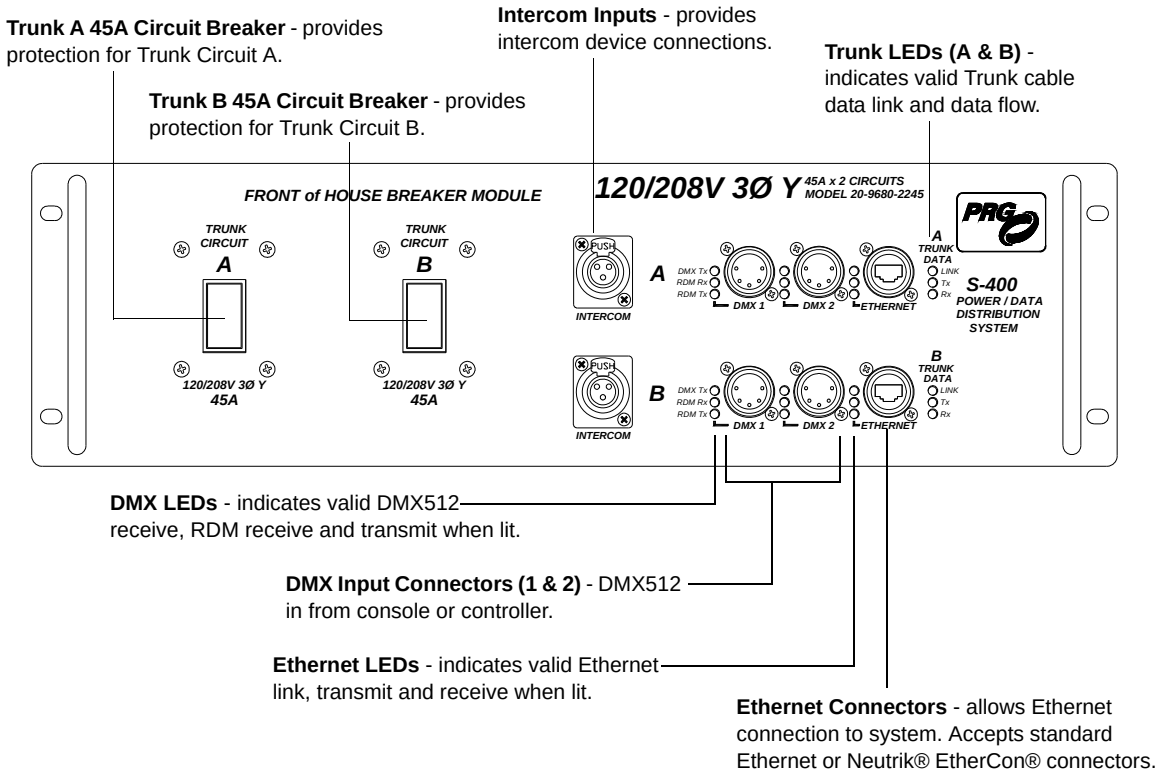

Trunk A 45A Circuit Breaker - provides protection for Trunk Circuit A.
Trunk B 45A Circuit Breaker - provides protection for Trunk Circuit B.
Intercom Inputs - provides intercom device connections.
Trunk LEDs (A & B) - indicates valid Trunk cable data link and data flow.
FRONT of HOUSE BREAKER MODULE
120/208V 3Ø Y
45A x 2 CIRCUITS
MODEL 20-9680-2245
TRUNK CIRCUIT A
TRUNK CIRCUIT B
120/208V 3Ø Y 45A
INTERCOM
DMX 1
DMX 2
ETHERNET
TRUNK DATA
LINK
Tx
Rx
S-400
POWER / DATA DISTRIBUTION SYSTEM
DMX LEDs - indicates valid DMX512 receive, RDM receive and transmit when lit.
DMX Input Connectors (1 & 2) - DMX512 in from console or controller.
Ethernet LEDs - indicates valid Ethernet link, transmit and receive when lit.
Ethernet Connectors - allows Ethernet connection to system. Accepts standard Ethernet or Neutrik® EtherCon® connectors.

Figure 1-14: Front of House Breaker Module Connections and Indicators

Front of House Trunk DC Adapter

The purpose of the Trunk DC Adapter is to power the internal circuit boards in all versions of S400 Front of House Breakout Modules without using a Trunk Cable. This enables multiple DMX512 Universes to be converted to Ethernet outputs.

The Truck DC Adapter is connected to the standard Trunk Connector on the side of the FOH Breakout Module as shown in **Figure 1-15**.

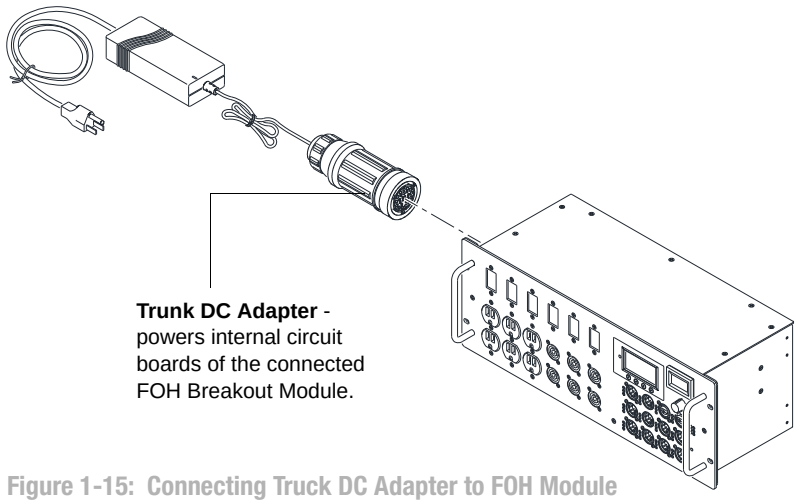


Figure 1-15: Connecting Truck DC Adapter to FOH Module

Front of House A/B Switch

This component requires software version 2.0 or greater.

The Front of House A/B Switch is connected to a FOH Breakout Module to provide a convenient method for switching between two sets of DMX512 universes (A and B). With software v2.0, all input universes are given a Source Identifier, in addition to a Universe Number. The default is Source A. Sources A, B, C or * can be selected at a Breaker Module's Menu Display (refer to "Menu Display Features" on page 39). Sources A or B can be toggled by pressing the appropriate selector button at the A/B Switch. (Source C is normally reserved for system testing and/or setup and is not selectable at the A/B Switch. System Source * is omnipresent and is also not selectable at the A/B Switch.)

As an example, two universes from a primary console could be input into the FOH Breakout Module and labeled 0a and 1a. Two (mirrored) universes could be added from a backup console and labeled 0b and 1b. The system outputs would be assigned 0 or 1 as appropriate. All universes from both consoles are active on the network all the time, making it possible to verify that both desks are up and running by checking the source status. A third source (C) has been provided for an additional input, such as a tech console.

The A/B Switch indicates the current source with state of its backlit selector switches, even if this is changed elsewhere (i.e., using the Menu Display feature). The selector states indicate the following:

- A Selector lit - Source A universes are selected.
- B Selector lit - Source B universes are selected.
- Both A and B Selectors lit - Source C universes are selected.

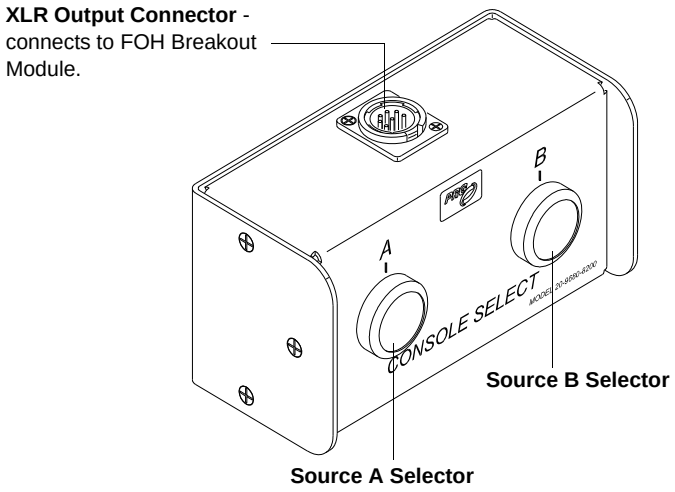


Figure 1-16: Front of House A/B Switch Connections and Indicators

CAUTION: Connecting or disconnecting an A/B Switch while the system is powered up can cause an apparent switch closure resulting in a change to the source. This action is not recommended during a show-critical situation.

Note: The A/B Switch requires S400 software version 2.0 or greater, and a S400 7-pin cable.

10-Port Ethernet Switch

The PRG Series 400 10-Port Ethernet Switch provides a powerful and convenient interface between Virtuoso® or DMX512 control consoles and their control equipment. The 10-Port Ethernet Switch offers two types of connections: isolated copper Ethernet ports and fiber optic ports. The fiber optic ports provide the ability to send fast and reliable information up to 2 kilometers away without the need for repeaters using Virtuoso Fiber Optic Cable. The copper Ethernet connections offer the ability to combine standard copper connections with fiber optic transmissions. *Note*: Copper connections are limited to a maximum distance of 300 feet.

The 10-Port Ethernet Switch automatically determines the speed of each network connection based on the equipment connected to the switch and supports multiple connections with transmission and reception occurring simultaneously.

The following illustrations provide a detailed description of Series 400 10-Port Ethernet Switch connections, controls and indicators.

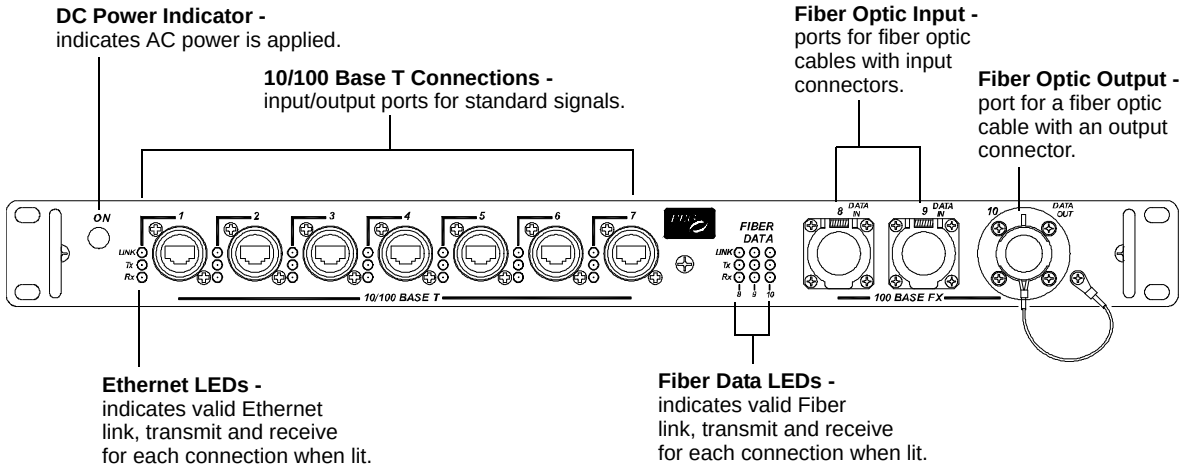


Figure 1-17: 10-Port Ethernet Switch Front Panel

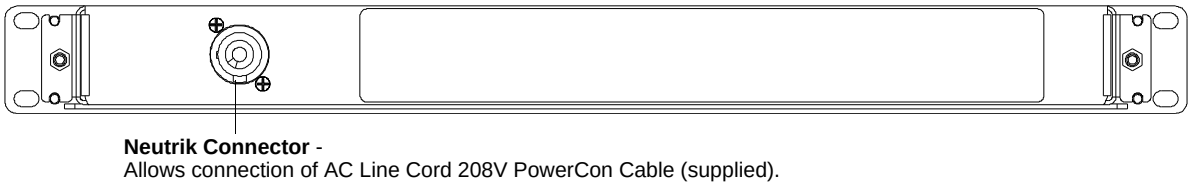


Figure 1-18: 10-Port Ethernet Switch Rear Panel

7-Port Ethernet Switch

The PRG Series 400 7-Port Ethernet Switch provides a powerful and convenient interface between Virtuoso® or DMX512 control consoles and their control equipment. The 7-Port Ethernet Switch provides seven isolated copper Ethernet ports. *Note*: Copper connections are limited to a maximum distance of 300 feet.

The 7-Port Ethernet Switch automatically determines the speed of each network connection based on the equipment connected to the switch and supports multiple connections with transmission and reception occurring simultaneously.

The following illustrations provide a detailed description of Series 400 7-Port Ethernet Switch connections, controls and indicators.

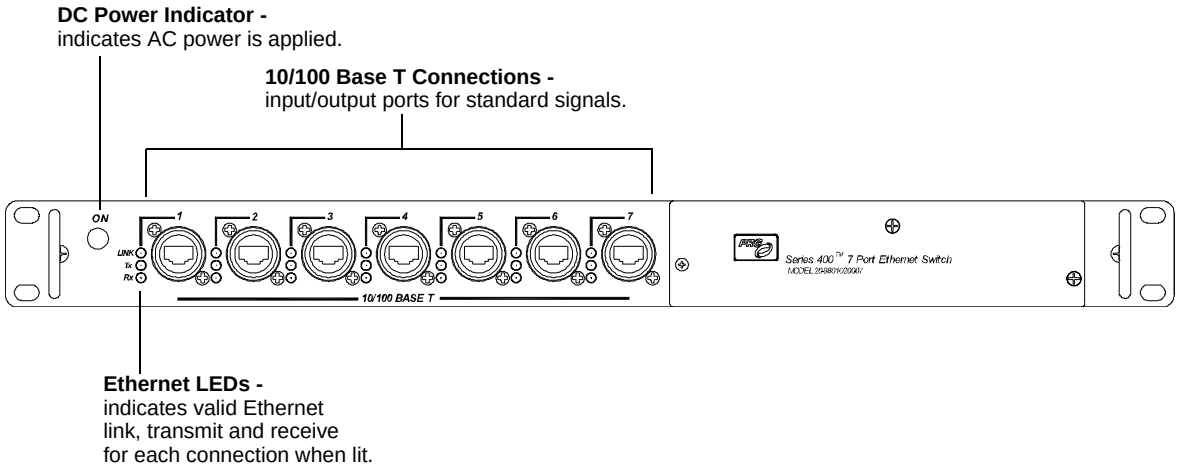


Figure 1-19: 7-Port Ethernet Switch Front Panel

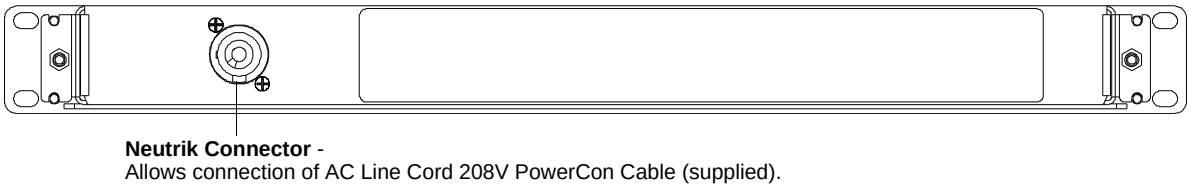


Figure 1-20: 7-Port Ethernet Switch Rear Panel

THEORY OF OPERATION

Rack System

A Rolling Rack houses an internal 3-phase, 400 Amp bus bar system which is connected to the house power service by 4/0 Cam-Lok cables. The Rack accepts hot-swappable chassis modules that automatically connect to the internal power bus. These Breaker Modules supply various types of AC power to individually protected branch circuits. The branch circuits are conducted to remote Breakout Boxes by custom Trunk Cables and connectors capable of powering 1200 watt luminaires at distances of up to 500 feet.

An integrated Signal Distribution System is provided where control data is applied at the Series 400 Rack. This data is transmitted by the Trunk Cables to the remote Breakout Boxes where it is available for luminaires or other devices. The Signal System will accept 10/100Mb/sec Ethernet, USITT DMX512, and DMX512-over-Ethernet, and will handle all three protocols simultaneously. The DMX512 universes are available at each of two outputs on the Breakout Boxes. The Menu Display on each Breaker Module can be used to configure which universe is output to each connector (refer to "Menu Display Features" on page 39).

The Series 400 rack supports multiple input systems (software v2.0 or greater) and DMX merging (software v3.0 or greater). All DMX512 inputs are configured with a Universe Number and a Source (A, B, C, *). (Outputs are only assigned with a Universe Number.) The output device will send the numbered universe for the currently selected source, i.e., if configured for universe 0 it will send either universe 0a, 0b, or 0c depending on which input is selected. For complete instructions on setting up system input/outputs, refer to "Menu Display Features" on page 39.

The Front of House Breakout Module is connected by up to 500 feet of Trunk Cable to the Series 400 Rack where a FOH Breaker Module sources power for the FOH System. Source-assignable Art-Net input using the Ethernet connectors can replace functionality of the top two DMX inputs on a Front of House (FOH) Breakout Module. This allows assignment of an Ethernet port to a source so that it can be switched over with the rest of the A, B, C sources.

WARNING: A 400 Amp Disconnect *must be used* when house service is greater than 400 amps and more than 10 feet from rack. 4/Ø feeders are rated for 400 amps or less. It is recommended that a PRG Series 400 400 Amp Disconnect be used. Refer to the Series 400 400 Amp Disconnect User Manual (02.9680.0200).

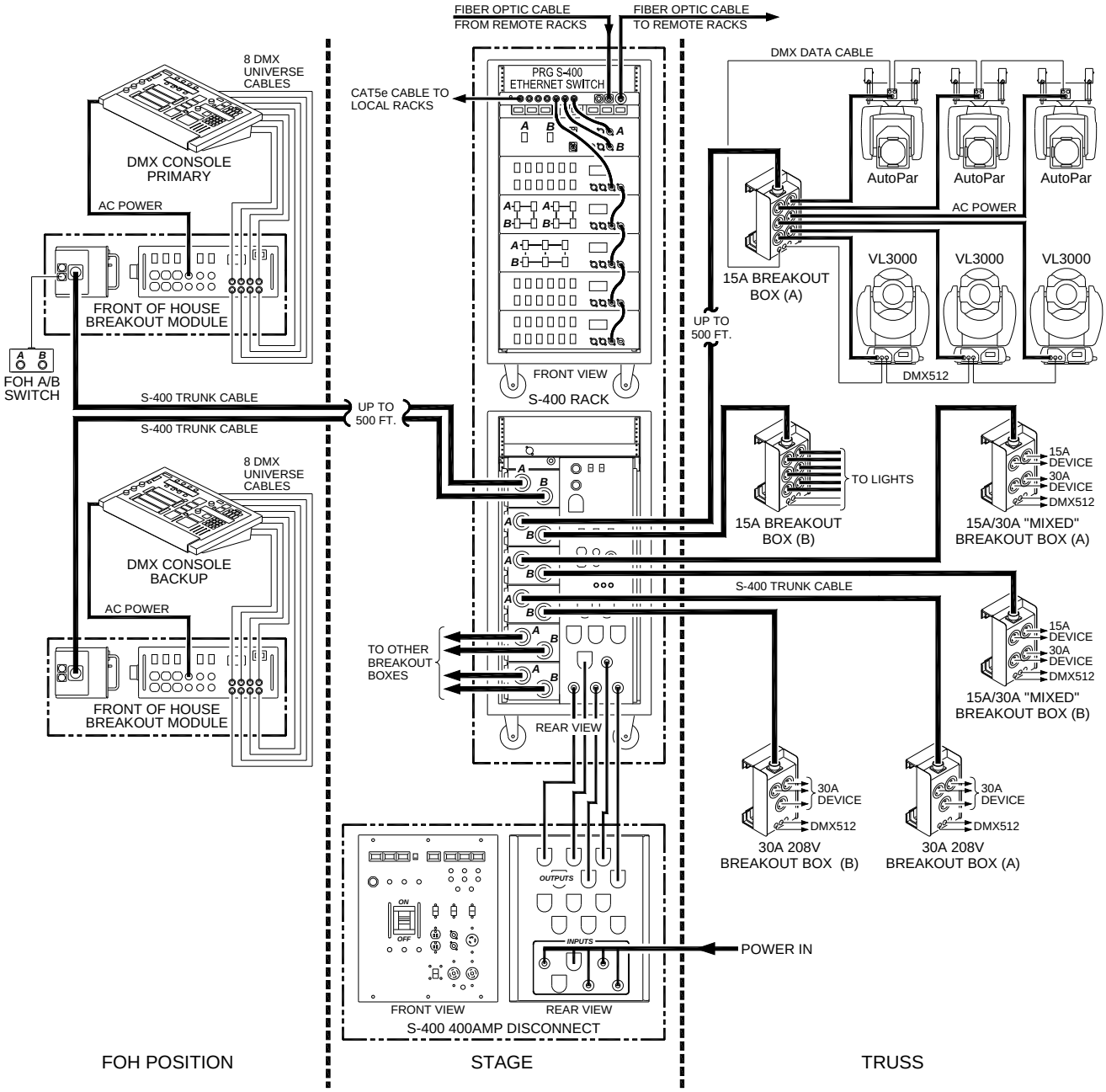


Figure 1-21: Sample Rack Configuration Diagram

Note: For additional installation diagrams, refer to the PRG Lighting Systems Networking Guide (02.3004.1000.0).

2.

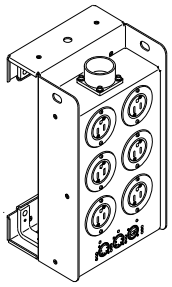
INSTALLATION

This chapter provides instructions for connecting rack components and powering up the system.

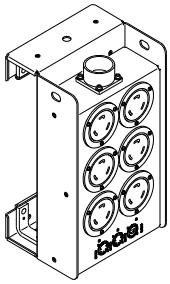
+ SYSTEM INSTALLATION AND POWER UP
+ POWER DOWN

Load Distribution

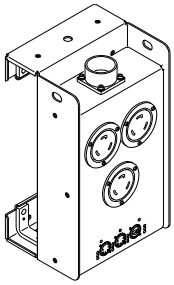
Consideration for proper load distribution should be followed when connecting devices. Be sure to evenly distribute the load across the phases. Refer to the following charts.



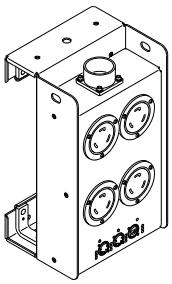
15A 120V Breakout Box	
Connector	Phase
1	X - N
2	Y - N
3	Z - N
4	X - N
5	Y - N
6	Z - N



15A 208V Breakout Box	
Connector	Phase
1	X - Y
2	Y - Z
3	Z - X
4	X - Y
5	Y - Z
6	Z - X



30A 208V Breakout Box	
Connector	Phase
1	X - Y
2	Y - Z
3	Z - X



15A/30A Mixed Breakout Box	
Connector	Phase
1 (15A)	X - Y
2 (15A)	X - Y
3 (30A)	Y - Z
4 (30A)	Z - X

For convenience, these phase specifications are printed on the front panel of each Breakout Box.

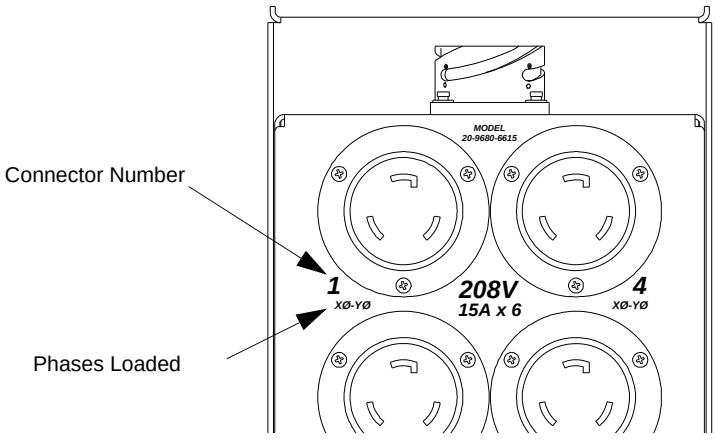


Figure 2-1: Phase Specifications

Component and Power Connections

For examples of basic system configurations, refer to "Theory of Operation" on page 23.

Use the following procedure to connect rack components:

Step 1. Place rack in desired location and remove front and back covers (**Figure 2-2**).

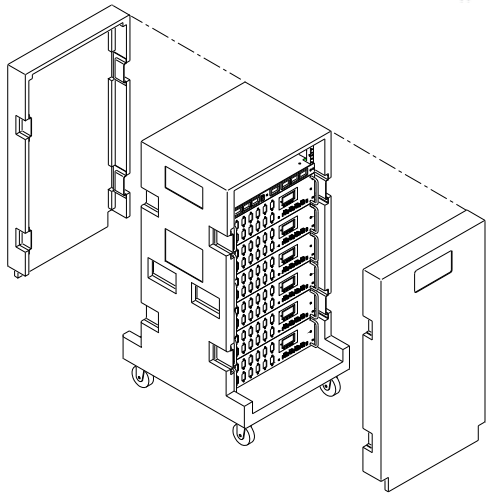


Figure 2-2: Removing Rack Covers

Step 2. Turn OFF all breakers at Rack and Breakout Boxes.

Step 3. Turn OFF Mater Switch.

CAUTION: Always use safety cables when installing Breakout Boxes in truss.

Step 4. Install Breakout Boxes in truss or other location near fixtures. Refer to "Breakout Box Mounting Options" on page 33 for mounting options. Attach safety cable.

Step 5. Connect appropriate length Trunk Cables to Breakout Box trunk connectors and route towards rack (**Figure 2-3**).

Step 6. Connect required fixtures and data devices to Breakout Boxes. Refer to "Breakout Box" on page 17 for detailed connection diagram.

CAUTION: Evenly distribute the load across phases. Refer to "Load Distribution" on page 26.

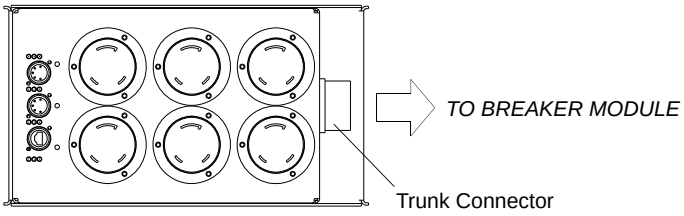


Figure 2-3: Breakout Box Trunk Connection

Step 7. If required, place Front of House Breakout Box near lighting control console. Connect appropriate length Trunk Cable to trunk connector and route towards rack (**Figure 2-4**).

Step 8. Connect console and other auxiliary devices to Front of House Breakout Box. Refer to "Front of House Breakout Module" on page 18 for detailed connection diagram.

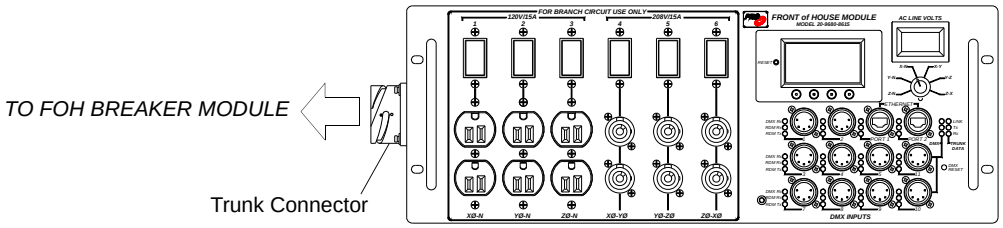


Figure 2-4: FOH Module Trunk Connection

WARNING: A 400 Amp Disconnect *must be used* when house service is greater than 400 amps and more than 10 feet from rack. 4/Ø feeders are rated for 400 amps or less. It is recommended that a PRG Series 400 400 Amp Disconnect be used. Refer to the Series 400 400 Amp Disconnect User Manual (02.9680.0200).

WARNING: Ensure house service mains breaker and rack Master Switch are OFF before connecting mains power cables to rack. Ground should *always* be connected first.

Step 9. At house service mains breaker (or 400 Amp Disconnect), turn power OFF.

Step 10. At Series 400 Rack, ensure Master Switch is OFF. To disengage Master Switch, pull down red protective cover and press red button (**Figure 2-5**).

Step 11. Connect mains power cable Cam-Loks in the following order:
1) Ground, 2) Neutral 3) X Phase, 4) Y Phase, and 5) Z Phase.

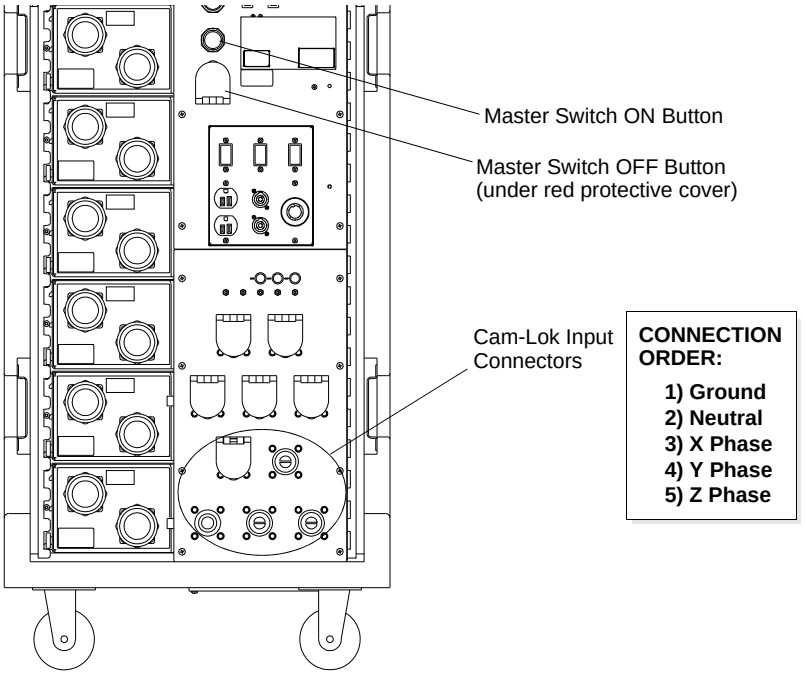


Figure 2-5: Disengaging Master Switch and Connecting Cam-Loks

Step 12. Proceed to next section for **Power Up** instructions.

Installing an Ethernet Switch

A Series 400 Ethernet Switch can be used independently or installed directly in a Series 400 rack chassis, using any blank space above the LED Meter Module.

To install in Series 400 rack:

Step 1. Install Ethernet Switch as required in top portion of rack chassis (**Figure 2-6**).

Step 2. At Ethernet Switch rear panel, connect AC Line Cord 208V PowerCon® Cable (supplied) to Neutrik® connector.

Step 3. After power is applied, verify that ON indicator is lit.

Step 4. At front panel, connect data cables as required.

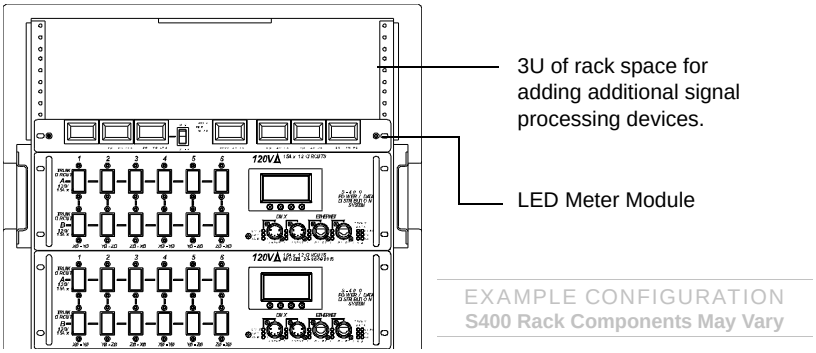

3U of rack space for adding additional signal processing devices.
LED Meter Module
EXAMPLE CONFIGURATION
S400 Rack Components May Vary

Figure 2-6: Additional Rack Space

The Series 400 10-Port Ethernet Switch connects Ethernet devices using *both* CAT5e copper wire *and* armored fiber optic cable. Copper wire communication ports conform to 10/100Base-Tx standards and the fiber ports conform to 10/100Base-Fx standards. The Series 400 7-Port Ethernet Switch connects Ethernet devices using *only* CAT5e copper wire.

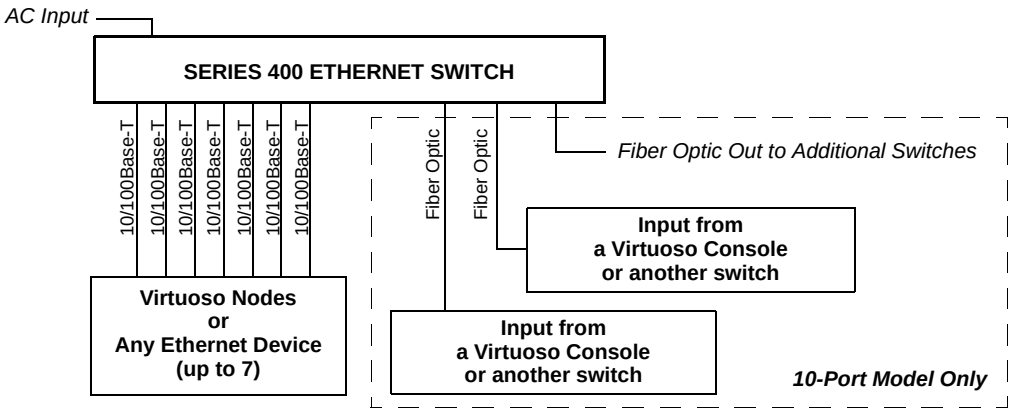


Figure 2-7: Ethernet Switch Connection Options

The following example system diagrams illustrate an Ethernet Switch being used with a Series 400 Power and Data Distribution Rack.

Note: Fiber optic connections are available only with the 10-Port Ethernet Switch.

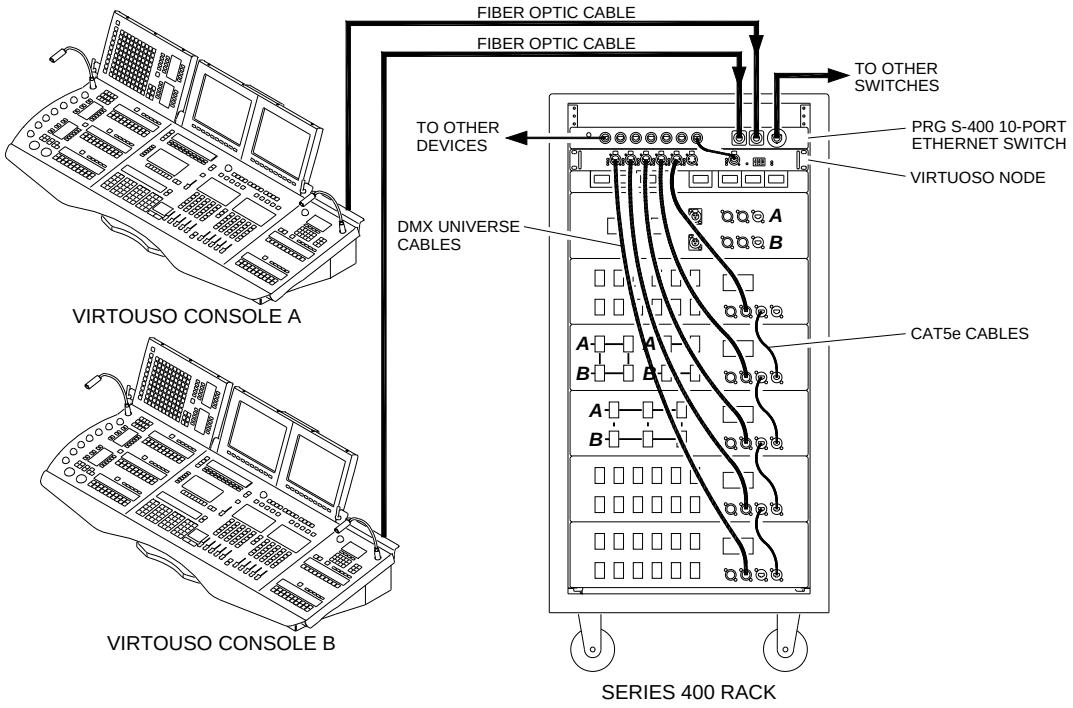


Figure 2-8: Sample Ethernet Switch Connection Diagram 1

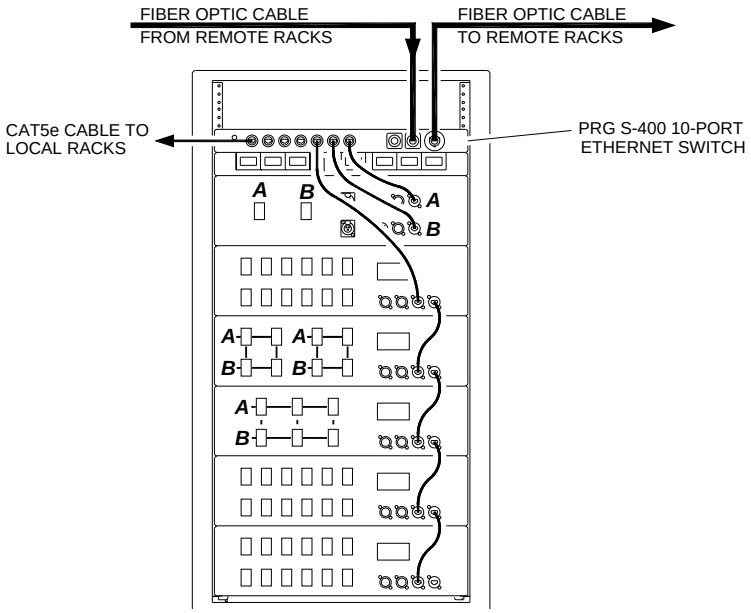

FIBER OPTIC CABLE FROM REMOTE RACKS
FIBER OPTIC CABLE TO REMOTE RACKS
CAT5e CABLE TO LOCAL RACKS
PRG S-400 10-PORT ETHERNET SWITCH

Figure 2-9: Sample Ethernet Switch Connection Diagram 2

Power Up Sequence

Use the following procedure to power up rack system:

Step 1. At house service mains breaker (or 400 Amp Disconnect), turn power ON.

Step 2. At rear of rack, verify all phase indicators are lit (**Figure 2-10**).

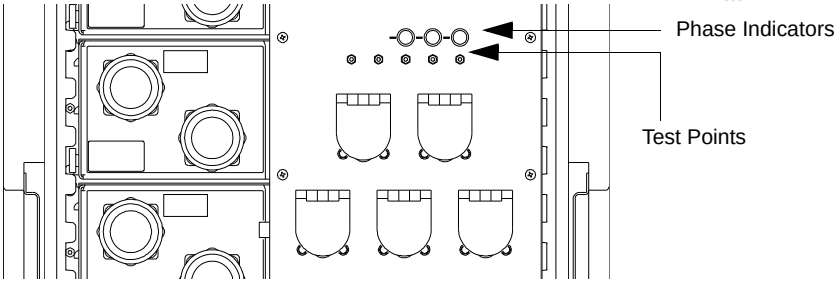


Figure 2-10: Phase Indicator and Test Point Locations

Step 3. Using AC voltmeter, check voltages at test points. Voltages should read as follows:

Test Connection	Voltage
Neutral to X	120V ± 5V
Neutral to Y	120V ± 5V
Neutral to Z	120V ± 5V
X to Y	208V ± 5V
X to Z	208V ± 5V
Y to Z	208V ± 5V
Neutral to Ground	0 to 1V

Step 4. If meter readings are normal, turn rack ON by pressing green Master Switch button (**Figure 2-10**).

Step 5. Verify that front panel LED meter readings match test point readings for proper voltage.

Step 6. Connect Trunk Cables (routed from Breakout Boxes and Front of House Breakout Box) to appropriate trunk connectors at rear of Breaker Modules. When properly connected, a click inside the Breaker Module will be heard as the Trunk Cable key engages. If there is no click, then components are not correctly configured. Refer to "Troubleshooting" on page 52.

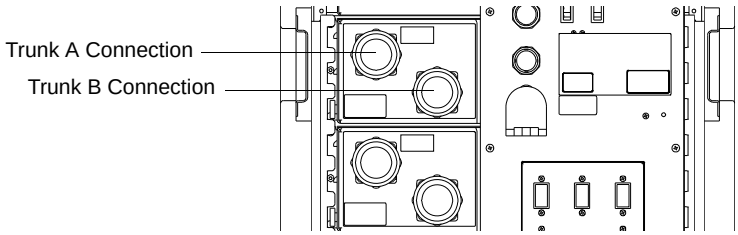


Figure 2-11: Breaker Module Rear Trunk Connectors

Step 7. Connect auxiliary equipment to convenience outlets as required.

Step 8. Connect data devices as required.

Step 9. Using Menu Displays, configure DMX universes as required. Refer to "Menu Display Features" on page 39.

Step 10. At Breaker Modules, switch breakers ON to provide power and data to connected fixtures (**Figure 2-12**).

Notes:

- When properly connected, a click inside the Breaker Module will be heard as the Trunk Cable key engages.
- When properly connected, the green Trunk Data LINK indicator will be lit.
- Connecting or disconnecting an A/B Switch while the system is powered up can cause an apparent switch closure resulting in a change to the source system.
- Connector numbers on the Breakout Boxes correspond to breaker switch numbers on the associated Breaker Module. A Breakout Box connected to TRUNK A corresponds to the breaker switches for Trunk Circuit A, while a Breakout Box connected to TRUNK B corresponds to the breaker switches for Trunk Circuit B. Refer to the following diagram:

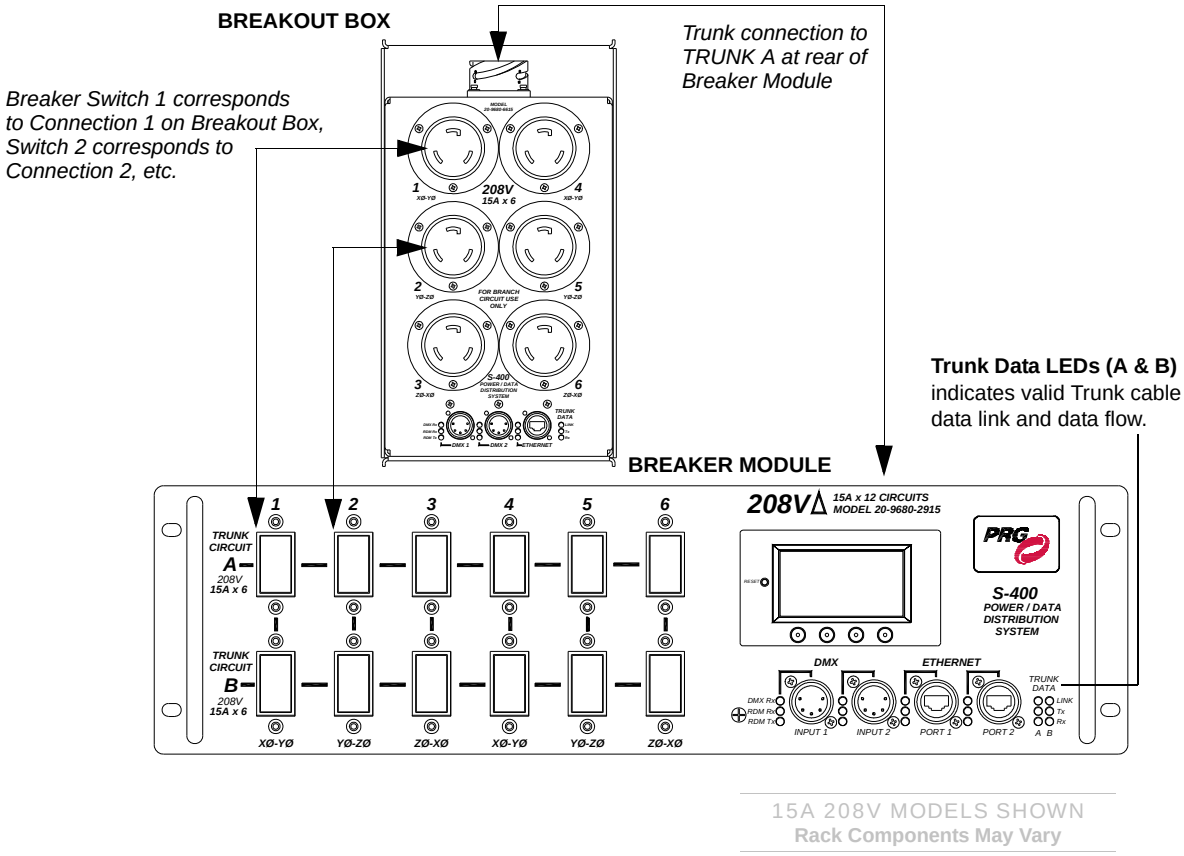

BREAKOUT BOX
Trunk connection to TRUNK A at rear of Breaker Module
Breaker Switch 1 corresponds to Connection 1 on Breakout Box, Switch 2 corresponds to Connection 2, etc.
Trunk Data LEDs (A & B) indicates valid Trunk cable data link and data flow.
BREAKER MODULE
208V 15A x 12 CIRCUITS MODEL 20-9680-2915
S-400 POWER / DATA DISTRIBUTION SYSTEM
TRUNK CIRCUIT A
TRUNK CIRCUIT B
208V 15A x 6
DMX
ETHERNET
TRUNK DATA
XØ-YØ
YØ-ZØ
ZØ-XØ
15A 208V MODELS SHOWN
Rack Components May Vary

Figure 2-12: Breaker Switch and Connector Numbering Scheme

Breakout Box Mounting Options

Breakout Boxes can be hung horizontally or vertically from any appropriate truss or structure. The Breakout Box provides threaded holes for mounting by wingbolts, along with two additional holes for attaching a clamp bracket or a variety of other hooks. The Mega-Claw truss hook is shown in these examples, however, other compatible truss hooks are available from different manufacturers.

CAUTION: A safety cable should be used in all mounting configurations. Attach as shown.

Wingbolt

Wingbolts are provided for mounting on standard 2-inch round truss pipe.

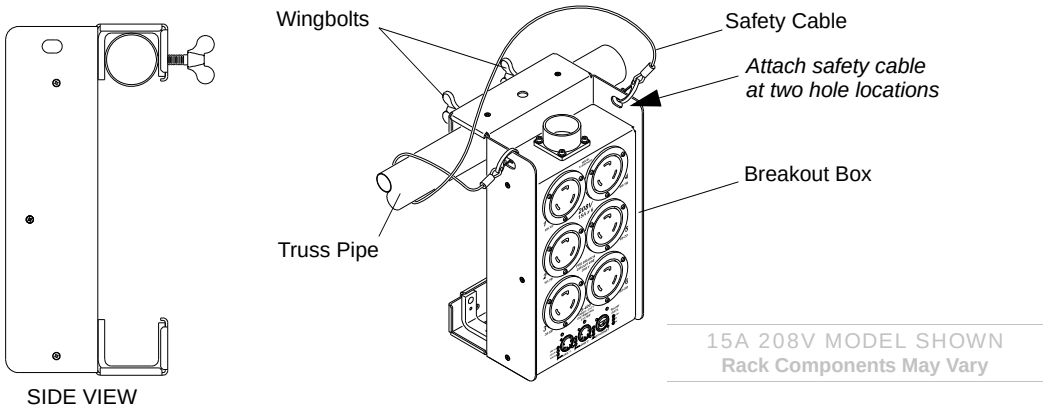


Figure 2-13: Wingbolt Mounting Method

Clamp Bracket Rail

In order to accommodate other mounting hooks, a clamp bracket rail (also used with VARI*LITE® Series 1000™, 2000™ and 3000™ luminaires) can be attached. The bracket requires two bushings, screws, nuts and the bracket itself (refer to "Accessories" on page 12 for part numbers).

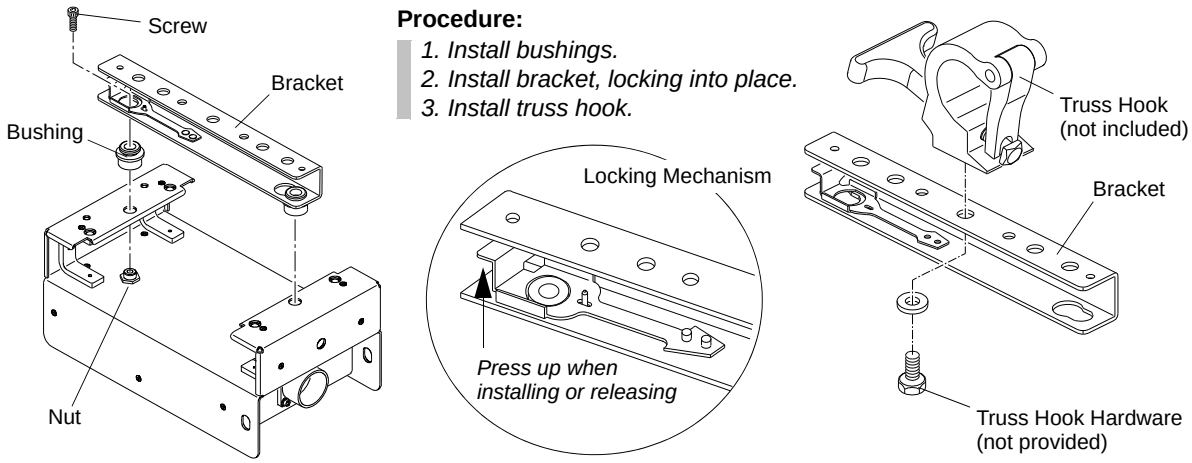


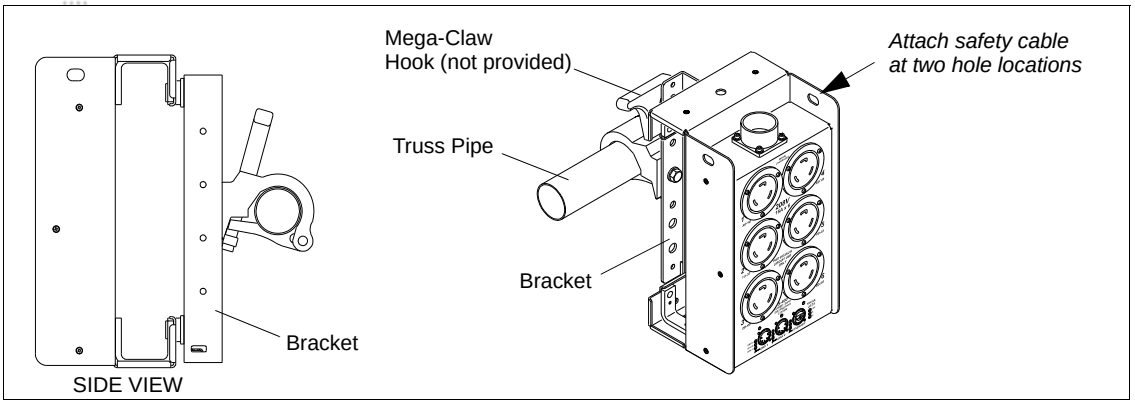
Figure 2-14: Installing Clamp Bracket

Mega-Claw

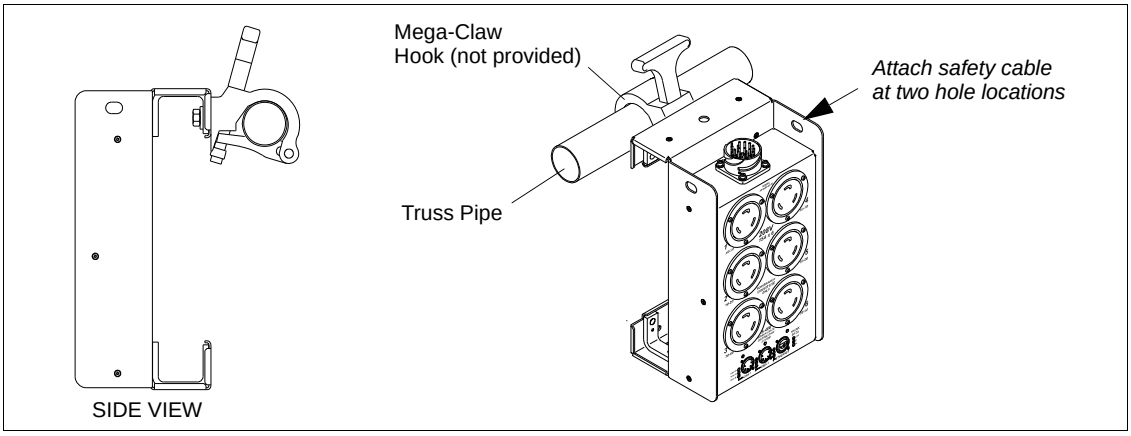
A Mega-Claw truss hook can be attached by several methods: directly onto the Breakout Box mounting flange *or* onto a clamp bracket. Refer to previous procedure for installing the clamp bracket. Install a Mega-Claw hook as follows:

208V MODEL SHOWN
Rack Components May Vary

Mounting With Clamp Bracket



Mounting Without Clamp Bracket - Back Mount



Mounting Without Clamp Bracket - Top Mount

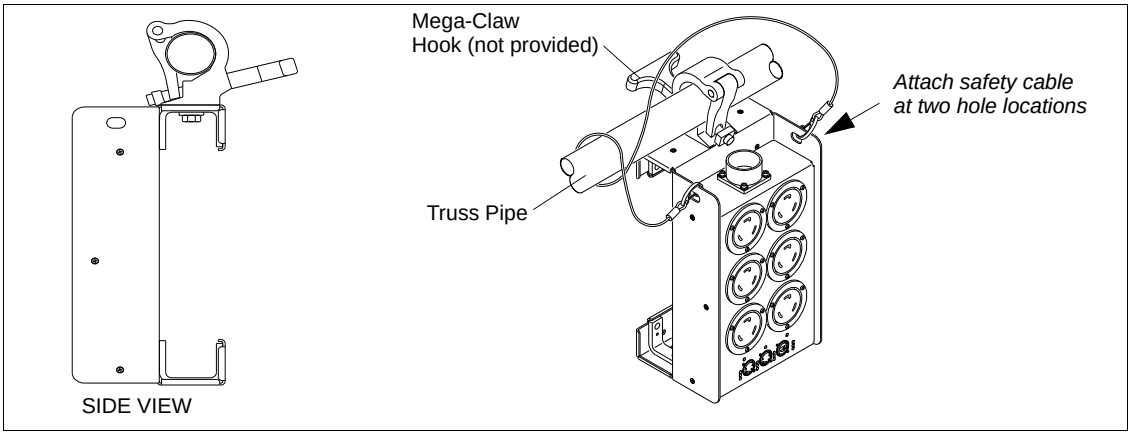


Figure 2-15: Mega-Claw Mounting Methods

POWER DOWN

Power Down Sequence

Use the following procedure to power down and disconnect rack components:

Step 1. At Series 400 Rack, turn Master Switch OFF. To disengage Master Switch, pull down red protective cover and press red button (**Figure 2-5**).

Step 2. At house service mains breaker (or 400 Amp Disconnect), turn power OFF.

Step 3. At rear of rack, verify all phase indicators are off (**Figure 2-10**).

WARNING: Ensure house service mains breaker and rack Master Switch are OFF before disconnecting mains power cables from rack. Verify this by checking phase indicators on the rear rack panel. Ground should *always* be disconnected last.

Step 4. Disconnect mains power cable Cam-Loks in the following reverse order: 1) Z Phase, 2) Y Phase, 3) X Phase, 4) Neutral, and 5) Ground.

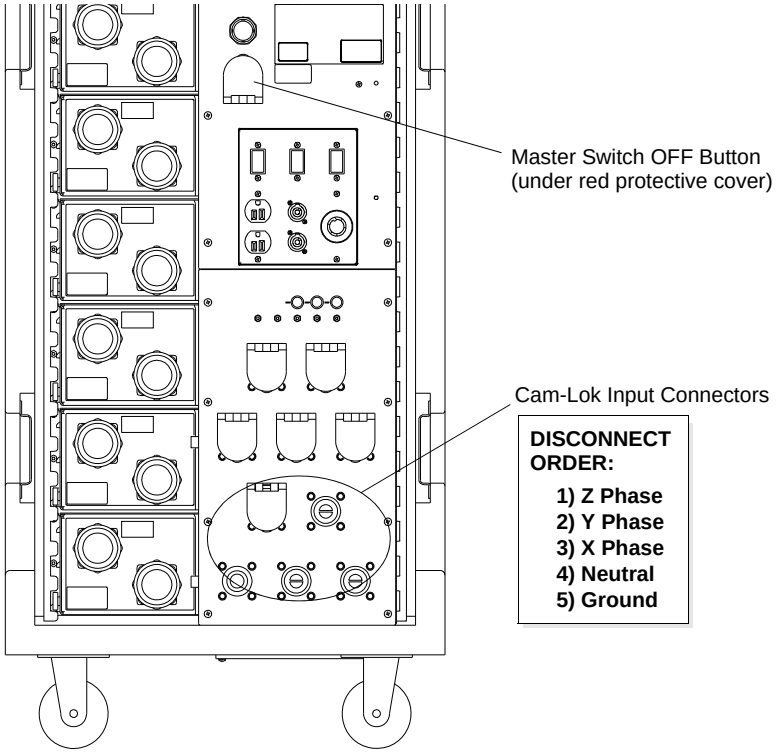


Figure 2-16: Disengaging Master Switch and Disconnecting Cam-Loks

Step 5. At Breaker Modules, disconnect Trunk Cables.

Step 6. Disconnect Trunk Cables from all peripheral equipment such as Breakout Boxes and Front of House Modules.

Notes

3.

OPERATION

This chapter provides detailed instructions for configuring source inputs and using the Menu Display features.

+ SYSTEM SUPPORT
+ MENU DISPLAY FEATURES
+ SOFTWARE UPGRADES

Multiple DMX512 Input Sources

The Series 400 rack supports multiple input sources (software v2.0 or greater) and DMX merging (software v3.0 or greater). All DMX512 inputs are configured with a Universe Number and a Source Identifier (A, B, C, *). (Outputs are only assigned with a Universe Number.) The output device will send the numbered universe for the currently selected source, i.e., if configured for Universe 0, it will send either Universe 0a, 0b, 0c or 0* depending on which input is selected. A fourth, omnipresent input source labeled "*" (asterisk) provides a universal, un-switched DMX512 input. In this case, no matter which source you choose, A, B, or C, the * sources will always be active. If enabled, DMX Merge provides the ability to have more than one DMX universe input specified for the same universe.

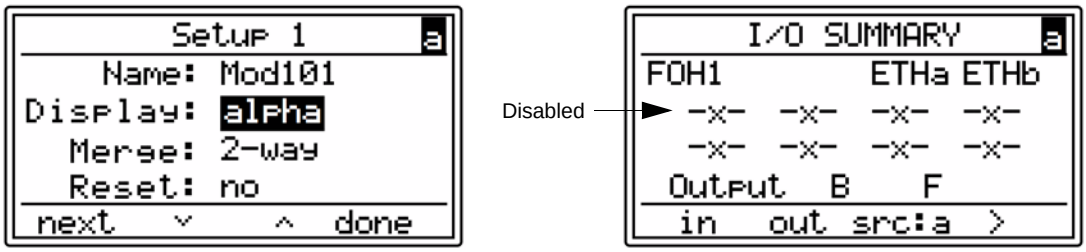
The source is selected via the Menu Display at a Breaker Module or Front of House Module (refer to "Menu Display Features" on page 39), via an A/B Switch (refer to "Front of House A/B Switch" on page 20) or via the S400Tools Utility application (refer to the separate S400Tools User Manual). The Menu Display and A/B Switch both indicate the current source. To change the source from the SOURCE SELECTION menu, select the src:x menu item, pick the desired source, then press exit (refer to "Source Selection" on page 43 for complete menu instructions). The numbers shown by each source are the number of DMX512 universes active on the network for that system.

The A/B Switch allows instant selection of Source A or B, and also indicates the current source via the backlighting on the A and B selectors. If Source C is active, both selectors will be lit. System Source * is omnipresent and is not selectable at the A/B Switch.

CAUTION: Connecting or disconnecting an A/B Switch while the system is powered up can cause an apparent switch closure resulting in a change to the source system. This action is not recommended during a show-critical situation.

DMX Universes Display Preference

DMX512 universes are displayed as either alpha (A-JV) or numeric (000-255). This preference can be configured in the SETUP 1 menu. DMX512 inputs or outputs can also be disabled, shown as -x-. By default, all inputs are disabled and outputs are set to A and B.



DMX Merge

DMX Merge capability has been implemented which provides the ability to have more than one DMX universe input specified for the same universe. Options include 2-Way, 3-Way and 4-Way which allows up to four inputs per universe. Multiple sources of the same universe will be merged using the Highest Takes Precedence (HTP) rule and is a system-wide option. Once enabled, all inputs have merge capability.

The Merge options can be configured in the SETUP 1 menu:

MENU DISPLAY FEATURES

Overview

The Menu Display, located on each Rack Breaker Module, is used to configure, test and access internal status information for the PRG Series 400 Comm System. The soft-programmable buttons are used with the dynamic menu options, while the Reset button performs a hard rest of the module's processor.

Note: Pressing the Reset button may interrupt any DMX512 universes on the network briefly, since the switch will also go into a reset state while the button is held down.

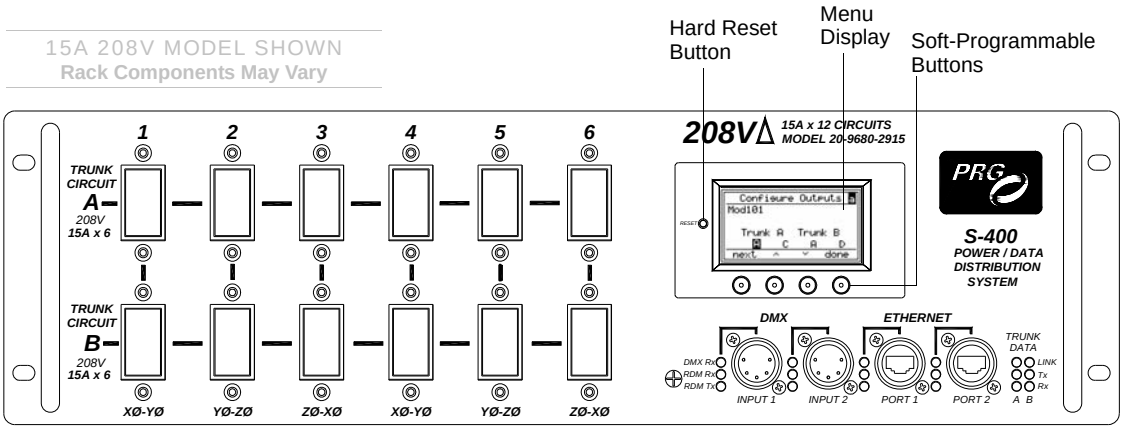


Figure 3-1: Menu Display Controls

The top line of the window displays the title of the current menu, while the center section displays the menu-specific information. The bottom line provides the button functions applicable to that particular menu page. The right arrow (>) symbol in the last button position indicates that there are more options available. These options will cycle through as the right arrow (>) button is pressed.

Note: The buttons will auto-repeat if held down.

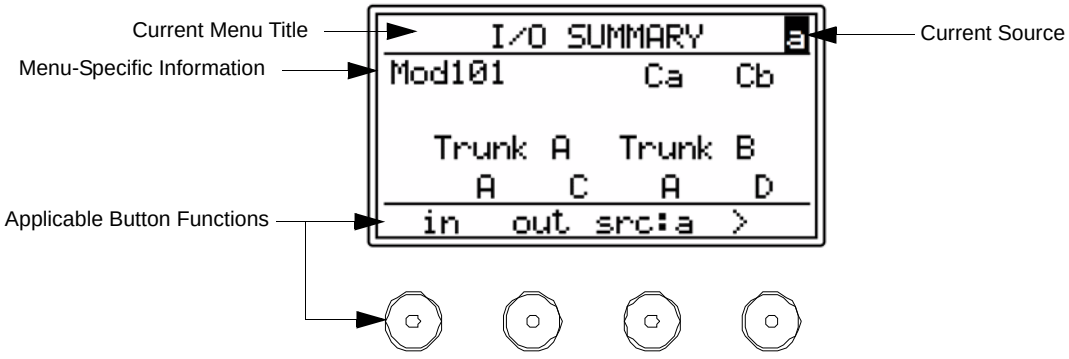


Figure 3-2: Menu Layout

Menu Structure

The entire v3.0 menu structure is as follows:

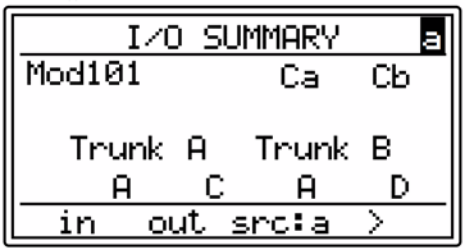
```
Input/Output Summary
  ↳ in (configure inputs)
  ↳ out (configure outputs)
  ↳ src (configure system input source)
  ↳ sys (system overview)
      ↳ univ – System: Universes
      ↳ mod – System: Rack Modules
      ↳ foh – System: FOH
  ↳ Setup 1 (configure system-wide settings)
        ↳ Name
        ↳ Display
        ↳ Merge
        ↳ Reset
  ↳ Setup 2(configure system-wide settings)
        ↳ Light
        ↳ Config
        ↳ S/N
  ↳ dmx (DMX monitor)
  ↳ info (software info)
      ↳ i/f (stored breakout/node info)
  ↳ net (network info)
  ↳ ethernet tests (trunk and ethernet cable tests)
      ↳ Ethernet Cable
      ↳ Trunk A
      ↳ Trunk B
```

Figure 3-3: Menu Structure Diagram

Menu Details

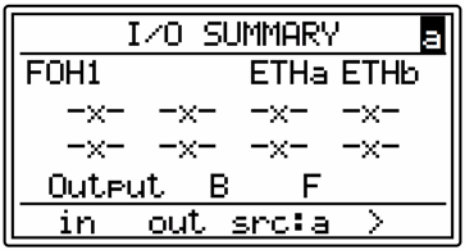
Input/Output Summary – Rack Module

This menu shows the configuration of the two DMX512 rack inputs and the two DMX512 outputs on each of the two Trunk Breakout Boxes. In this case, Input 1 (Ca) is Universe 1 from Source A and Input 2 (Cb) is Universe 2 from Source B. The system source default is Source A, indicated by src:a in the last line.



Input/Output Summary – Front of House Module

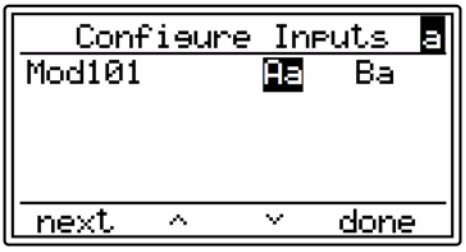
This menu shows the configuration of the ten DMX512 rack inputs (-x-) and the two outputs of the Front of House (FOH) Module (ETHa and ETHb). The letter after the input universe number indicates which of the three sources is being used for that particular universe. The letter after "src" in the last line, src:a, indicates that Source A is the current system default source.



Configure Inputs – Rack Module

This menu allows configuration of the two rack inputs.

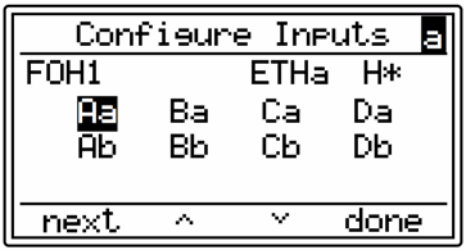
The highlighted universe (Aa) can be changed by selecting the down arrow (∨) or up arrow (∧). Move to the next universe by selecting next. Pressing done will prompt a confirmation screen that allows for changes to be committed or discarded. Note that if no changes were made, or the menu was changed but all items were returned to their initial value, pressing done will result in a simple exit to the I/O SUMMARY menu.



Configure Inputs – Front of House

This menu allows configuration of the ten Front of House (FOH) Module inputs.

The highlighted universe can be changed by selecting the down arrow (∨) or up arrow (∧). Move to the next universe by selecting next. Pressing done will prompt a confirmation screen that allows for changes to be committed or discarded. Note that if no changes were made, or the menu was changed but all items were returned to their initial value, pressing done will result in a simple exit to the I/O SUMMARY menu.

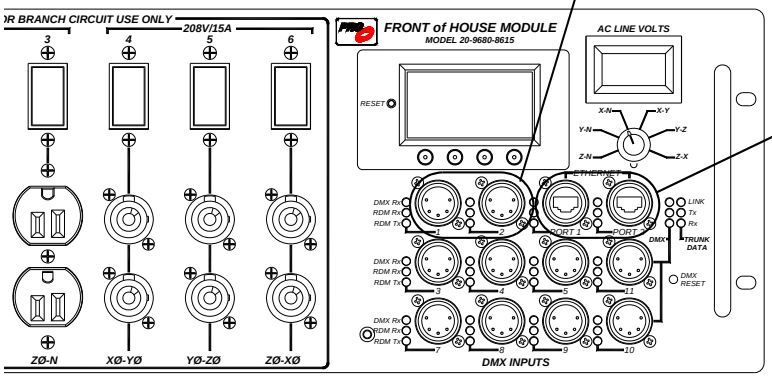


Source-Assignable Art-Net Input

An Ethernet input on a Front of House (FOH) module can be mapped to a particular system source. Standard Art-Net corresponds to System A, so it doesn't need to be re-mapped. A standard Art-Net output can be mapped to a different system (B, C, or *) by enabling that option on the FOH module. When Ethernet remapping is enabled on a module, the corresponding DMX inputs are disabled due to the increased processing requirements for handling the network packets.

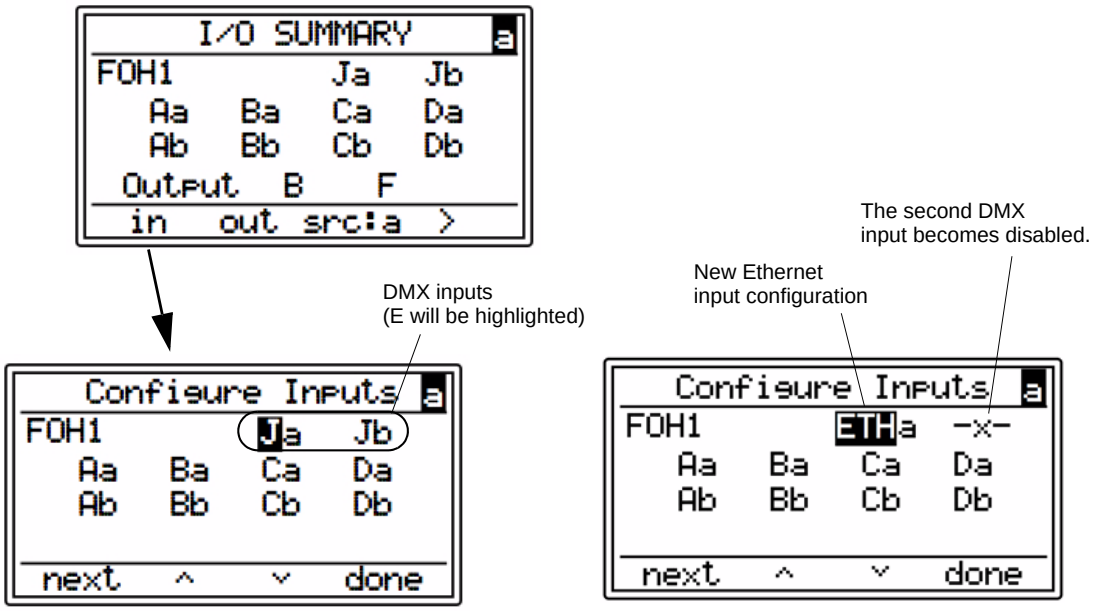
Front of House Breakout Module

DMX Input Port (2) - DMX512 input ports. Mutually exclusive with the Ethernet ports. If an Ethernet port is assigned to a source, this pair of DMX connectors are disabled.



Ethernet Ports (1 & 2) - Source-assignable Art-Net input ports.

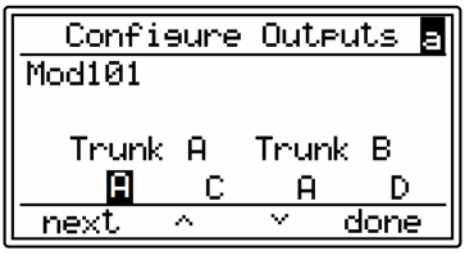
For example, access the I/O SUMMARY menu. Select "**in**" to open CONFIGURE INPUTS menu. At the first DMX input, change **Ja** to **ETHa** by scrolling with arrows and then pressing "**done**." Once the input is set to ETHa (Ethernet), the second DMX input becomes disabled (noted by **-x-**).



Configure Outputs – Rack Module

This menu allows configuration of the two DMX512 outputs on each of the two Trunk Breakout Boxes.

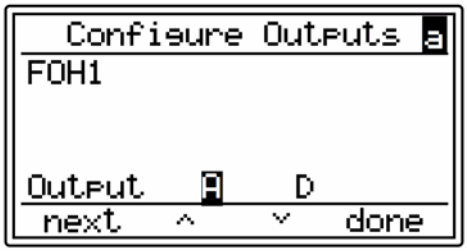
The highlighted universe can be changed by selecting the down arrow (∨) or up arrow (∧). Move to the next universe by selecting next. Pressing done will prompt a confirmation screen that allows for changes to be committed or discarded. Note that if no changes were made, or the menu was changed but all items were returned to their initial value, pressing done will result in a simple exit to the I/O SUMMARY menu.



Configure Outputs – Front of House Module

This menu allows configuration of the two DMX512 outputs on the associated Rack Module.

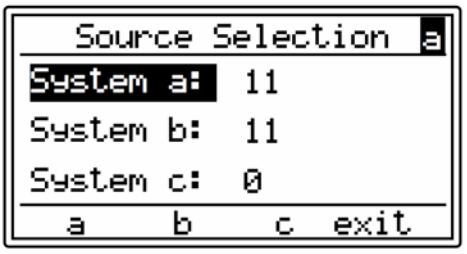
The highlighted universe can be changed by selecting the down arrow (∨) or up arrow (∧). Move to the next universe by selecting next. Pressing done will prompt a confirmation screen that allows for changes to be committed or discarded. Note that if no changes were made, or the menu was changed but all items were returned to their initial value, pressing done will result in a simple exit to the I/O SUMMARY menu.



Source Selection

This menu allows a choice of the module input system (source) and shows the number of active universes for each specified input source.

The highlighted source is the current source for this module. This can be changed by selecting the a, b, or c entry from the last row of the menu. When finished, pressing exit will bring up a confirmation that allows for a source change to be committed or discarded. Note that if no change was made, or the source was changed but it was returned to its initial value, pressing exit will return to the I/O SUMMARY menu.



System Overview

This menu shows a summary of system activity and devices. It displays racks in alphabetical order.

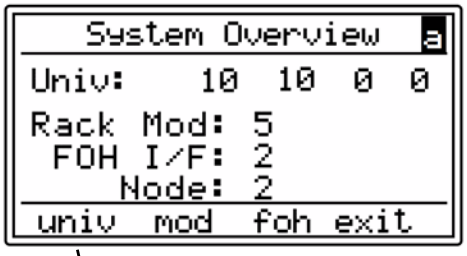
The Univ field shows the number of DMX512 universes currently active on the network. This is broken down by system source (A, B, C, and *) for each universe.

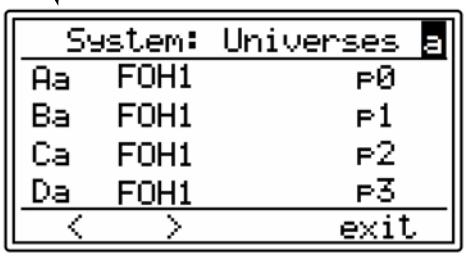
The Rack I/F field shows the number of Rack Modules on the network.

The FOH I/F field shows the number of Front of House modules on the network.

In this example, there are ten (10) universe inputs on sources A and B, zero (0) universe inputs on sources C and *, five (5) Rack Modules, two (2) FOH Module, and two (2) Nodes in the system.

Pressing univ will access the SYSTEM: UNIVERSES list which shows the name of the source device (if available) and the source port number.



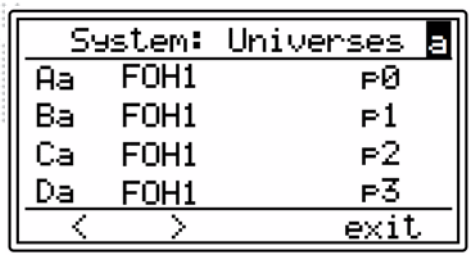


System: Universes

This menu shows all active universes on the network.

Up to four universes are displayed at a time. The display consists of the universe number and source (Aa), the module where that universe is defined as an input (FOH1), and the port used for the input to be connected to the device (p0).

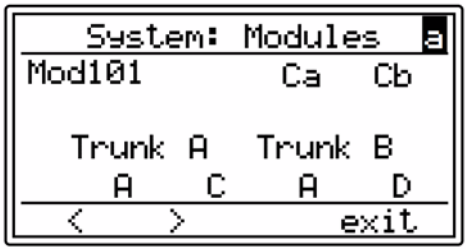
The left (<) and right (>) arrows allow the previous and subsequent universes to be displayed. Pressing exit will return to the SYSTEM OVERVIEW menu.



System: Rack Modules

This menu displays the Input/Output configuration of the Rack Modules on the network.

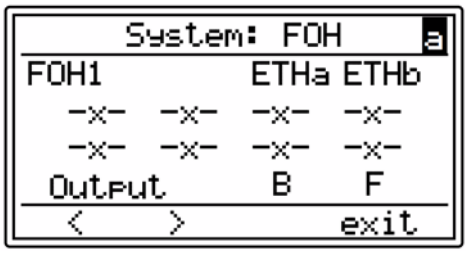
One Rack Module is displayed at a time (Mod101). The left (<) and right (>) arrows allow the previous and subsequent Racks to be displayed. Pressing exit will return to the SYSTEM OVERVIEW menu.



System: FOH

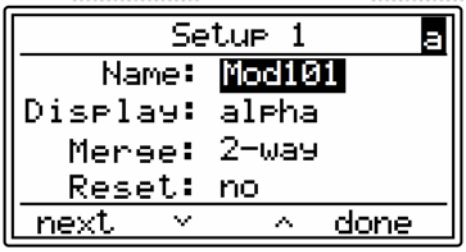
This menu displays the Input/Output configuration of the Front of House (FOH) Modules on the network.

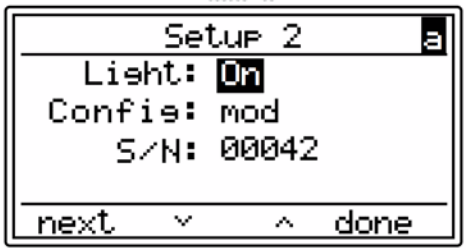
One FOH Module is displayed at a time (FOH1). The left (<) and right (>) arrows allow the previous and subsequent FOH Modules to be displayed. Pressing exit will return to the SYSTEM OVERVIEW menu.



Setup 1 and 2

These menus allow configuration of system options and reset to defaults.





The highlighted option can be changed by selecting the down arrow (∨) or up arrow (∧). Move to the next universe by selecting next. Pressing done will save changes and return to the main menu.

Name

+ Displays the current module device name.
+ To edit the device name, first select one of the arrow buttons, (∨) or (∧), while the Name menu entry is selected. This selection will open the module name characters as fields and allow for editing. Press next to move to the character(s) to be modified. The allowed characters are: letters 'a' - 'z', numerals '0' - '9', and the blank or space character ' '. The arrow buttons will scroll through the allowed characters in the order: letters, blank, numerals (assuming that the Up button is pressed and the initial value is the letter 'a'). If the first character of the name is a letter, it is uppercase. All other letters are lowercase.
+ Once name editing is initiated, pressing next will cycle through all of the available name character positions, followed by moving to the Display field, which closes name editing. The other menu entries follow as normal, before returning to the name field. Upon returning to the name field, it will be necessary to again initiate name editing if further modification is required. Until name editing is initiated, pressing next will simply cycle through the menu items in order, starting with the name entry.

Display

+ Sets DMX512 universe display to either alpha (A-JV) or numeric (000-255).

Merge

+ Enables the ability to have more than one DMX universe input specified for the same universe. Options include 2-Way, 3-Way and 4-Way which allows up to four inputs per universe. Merging operates under the Highest Takes Precedence (HTP) rule and is a system-wide option. Once enabled, all inputs have merge capability.

Reset

+ The Reset option allows reset of all the input and outputs to the default settings. To reset to defaults, select default in this field and then press done while the reset option is still selected.

Light

+ The Light option (page 2) allows the display backlight to be turned on or off. This is accomplished by pressing either arrow button (∨) or (∧) when the On/Off indication is selected. The backlight will go off (entering the *off* mode) and the indicator will be changed to Off. To return to the *on* mode, press either arrow button when the Off indication is selected. The backlight will be turned on and the indication will change to On.
+ If the backlight is in the *off* mode, pressing a button will turn on the light for 10 seconds, at which time it will automatically turn itself off. Note that pressing a button while the light is temporarily on, will reset the timer. If the light is in the *on* mode, it will stay on permanently unless it is manually turned off as described above.
+ When the backlight is in the *off* mode, the light will be turned on for about ten (10) seconds every time a button is pressed or the module is reset. The mode is saved whenever done is pressed. In order to change the mode, go to the SETUP 2 screen and explicitly change the mode by pressing an arrow button (∨) or (∧) and exiting by pressing the done button.

Config

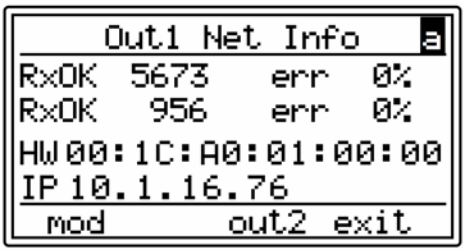
+ Allows the device to be switched between *rack* and *foh* modes. Note: The interface will automatically switch to *foh* mode if a DMX512 input board is detected on one of the Ethernet ports.

S/N

+ Displays the module's Serial Number.

Network Info

This menu displays errors, status information and network identification information. The menu will display information for Ethernet (mod), Trunk 1 (out1) and Trunk 2 (out2) communications.

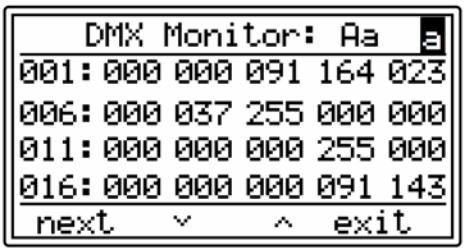


DMX Monitor

This menu shows the current data for a DMX512 universe.

The DMX universe number is shown in the title line (Aa). Press next to go to the next universe.

The first number of each line is the channel offset, followed by five channels of DMX512 data. Press the arrow buttons (∨) or (∧) to see another twenty of the 512 channels. Press exit to return to the main menu.

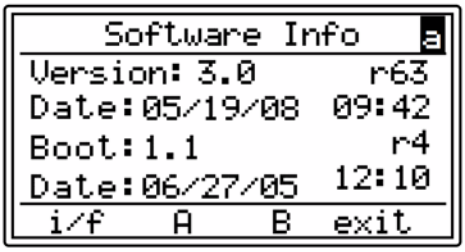


Note: The data is live, but only refreshes approximately every two seconds.

Software Info

This menu shows the current software version and boot version for the Series 400 system.

Note: The following is an example screen and may differ from the current released software version.



The Version field shows the system software version number.

The top Date field shows the system software date and time.

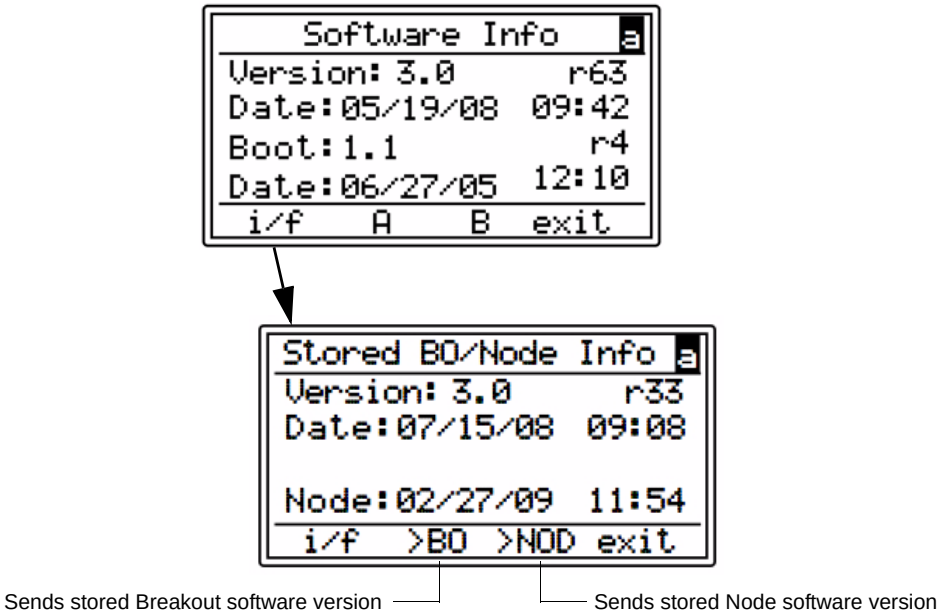
The Boot field shows the version number and date for the boot loader module.

The bottom Date field shows the boot loader date and time.

Pressing A will display the software version information for the device connected to Trunk A, while pressing B will display the software version information for the device connected to Trunk B. (The title line will indicate the type of device connected.) Press i/f to return to the SOFTWARE INFO menu for the interface device.

Pressing i/f while in the main SOFTWARE INFO menu will open the STORED BO/NODE INFO menu. This menu displays the software version information for the Breakout Boxes and Nodes (which store the software in their flash memory). It will also explicitly load Breakout or Node software from the Rack module.

+ The >BO button sends the stored Breakout version.
+ The >Nod button sends the stored Node version.
+ Pressing i/f while in the STORED BO/NODE INFO menu returns to the SOFTWARE INFO menu.

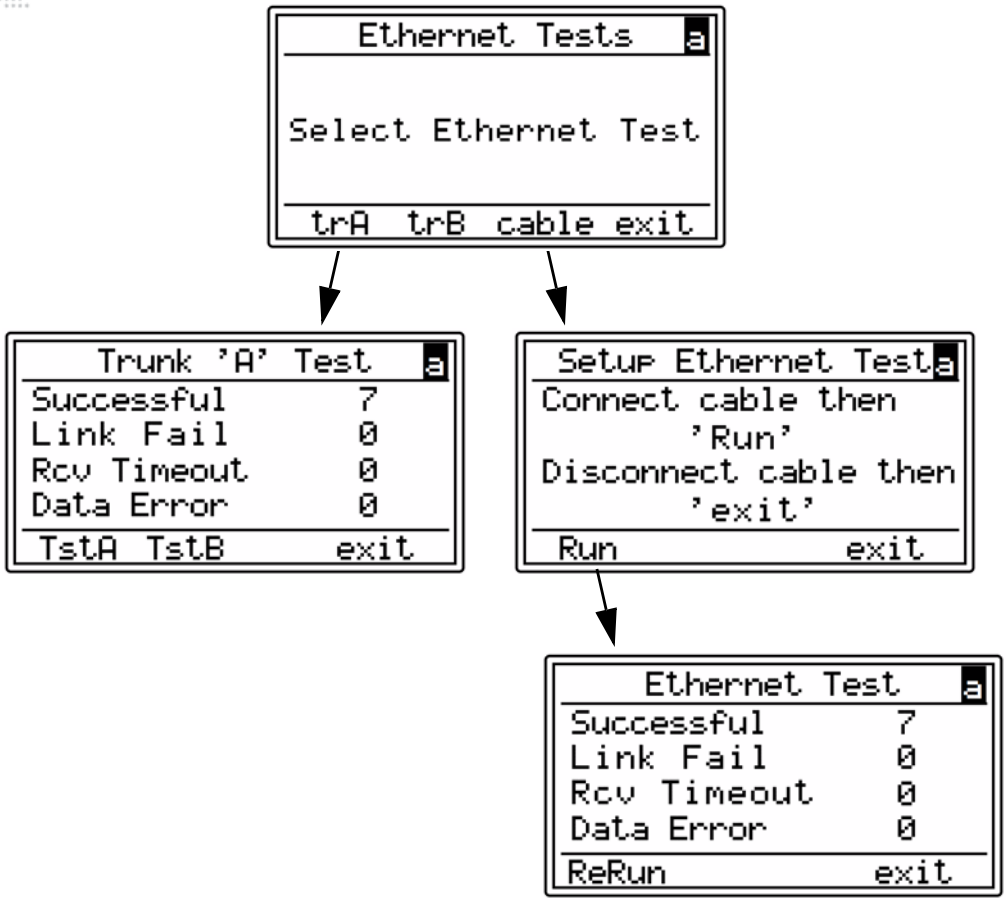


Press exit to return to the main menu.

Ethernet Tests

This menu provides the ability to test Trunk and Ethernet cables.

- A Trunk test (trA and trB) sends a round-trip test packet to the attached Breakout Box and back over the specified trunk cable.
- Cable test (cable) is used to verify a RJ-45 style cable using the connectors on the front panel. It sends a test packet from one of the ports on the front panel and expects to receive it on the other port.



SOFTWARE UPGRADES

Installing a New S400 Software Version

The S400Tools Utility should be used for all system software updates. S400Tools allows a system-wide software update with a single button press. Unlike previous versions of S400 software, v3.0 allows software update for all devices in a single packet (instead of updating devices one-by-one).

The S400Tools Utility application can be run on any Macintosh® or Java-enabled Windows® computer. Note that some Windows computers may not have Java installed, so it may be necessary to install Java run time before using with a PC. Java run-times are available at: http://java.com/getjava/. (Macintosh computers should already be Java-enabled.)

S400Tools

Requirements:

+ Macintosh® or Java-enabled Windows® computer (Java version 1.5 or later)
+ CAT5e Ethernet Cable

To install S400 Tools Utility:

Step 1. Download or copy S400Tools application file to computer.

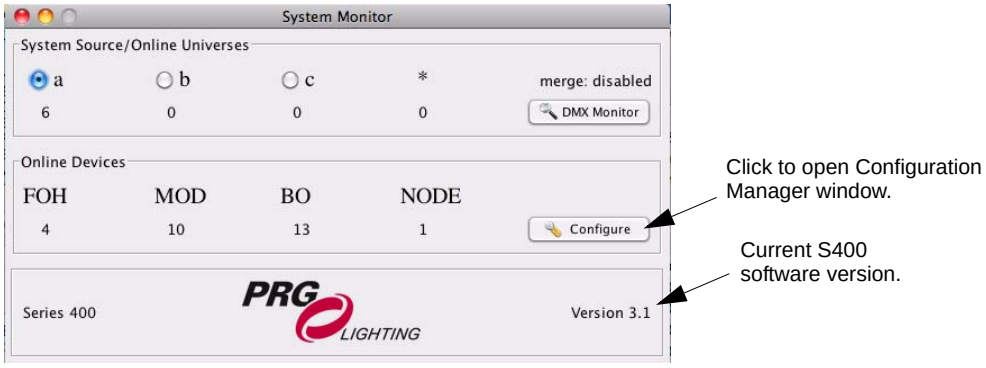
Step 2. Connect CAT5e Ethernet Cable from computer to Series 400 system.

Step 3. Configure network connection. The application looks for a port with an IP address in the pre-defined Series 400 subnet (10.66.x.x). Configure the IP address of the port to be used to an address in that range, such as 10.66.200.1, and the subnet mask to 255.255.0.0.

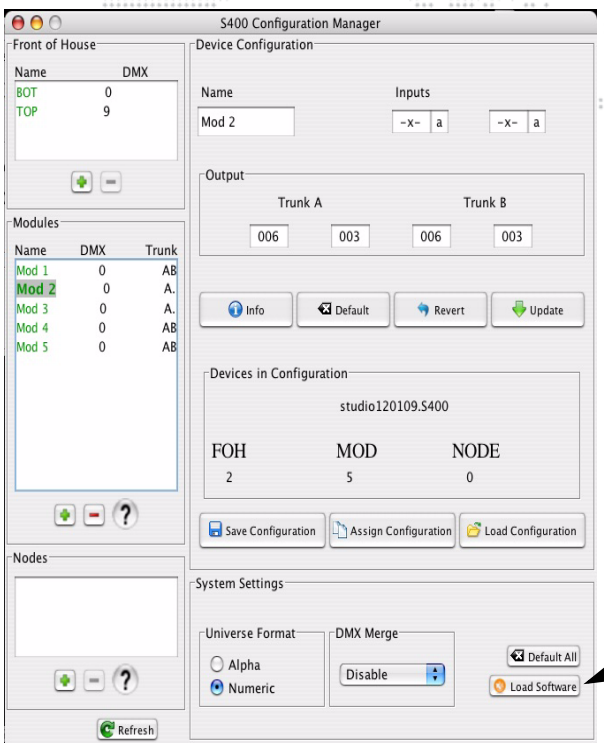
Step 4. At computer, locate S400Tools application icon. Double-click icon to launch program.

To update S400 system software:

Step 1. At System Monitor window, click **Configure** button.

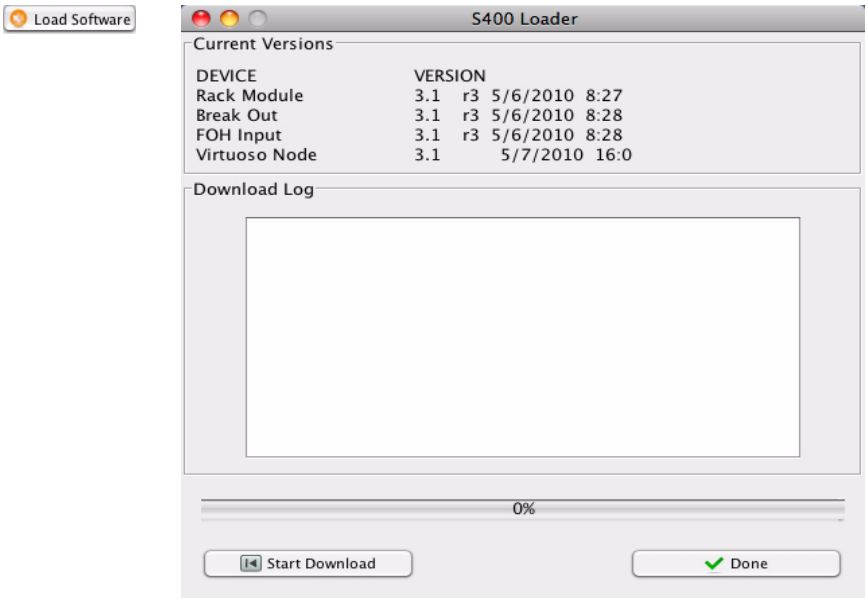


Step 2. At S400 Configuration Manager window, click **Load Software** button.



Click to launch S400 Loader window.

Step 3. At S400 Loader window, click **Start Download** button. The software downloads will be sent sequentially. Progress of the update will be shown via the text display and the progress bar.



Step 4. Press **Done** button when update is complete.

4.

TROUBLESHOOTING & MAINTENANCE

This chapter provides a basic troubleshooting guide, along with procedures for reconfiguration and extended care of the rack.

+ TROUBLESHOOTING
+ ROUTINE MAINTENANCE
+ RECONFIGURING COMPONENTS

Basic Troubleshooting Guide

Symptom(s)	Solution(s)
No power to rack. Phase indicators not lit.	1. Ensure Mains Cable Cam-Loks are connected to Inputs. 2. Turn on breaker at 400 Amp Disconnect. 3. Check for LVS failure (see below).
No power to connected devices or convenience outlets.	1. Engage green Master Switch button.
Power to convenience outlets, but not to connected fixtures (via Trunk Cable).	1. Switch breakers at front of Breaker Module(s) to ON position. 2. Ensure Trunk Cables are mated to matching Breakout Box.
No "clicking" sound when a Trunk Cable is connected to Breaker Module.	1. Ensure Breakout Box rating matches Breaker Module rating (120V or 208V) .
No control of connected fixtures.	1. Ensure DMX Universe(s) are correctly configured at Menu Display.

Checking For Proper LVS Operation

Inspection holes are provided at the rear of the rack in order to verify whether the two rack power supply (LVS) units are working properly. Each LVS has a green LED indicator which should be lit when power is applied to the rack.

At rear of rack, ensure proper operation of LVS units by checking LED status as follows:

Both LEDs lit: Status okay, both LVS units operating properly.

One LED lit: Status okay, but indicates that one LVS unit is not working and should be replaced.

No LEDs lit: Failure situation, both LVS units need to be replaced.

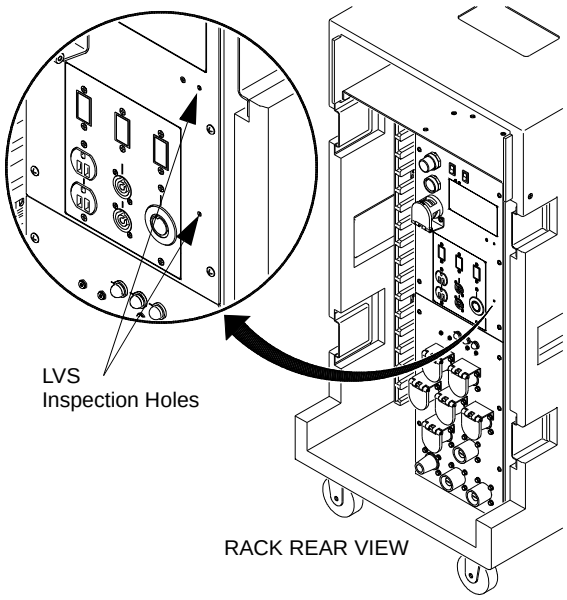


Figure 4-1: LVS Inspection Holes

ROUTINE MAINTENANCE

Cleaning/Replacing Air Filters

Air filters are located on the bottom of the rack tower and in each Breaker Module. These filters may need to be cleaned periodically, depending on amount of use and/or exposure to dusty environments.

Rack Filter

Parts:

40.7153.0001.0 AIR FILTER, SERIES 400 RACK

Tools:

#2 Phillips screwdriver

WARNING: Remove power from rack before performing any maintenance procedures.

To clean the rack air filter:

Step 1. Disconnect power to rack.

Step 2. Carefully tilt rack onto one side.

Step 3. Remove four screws securing filter bracket and remove bracket and filter.

Step 4. Clean filter with soap and water. Dry thoroughly.

Step 5. Re-install filter and bracket.

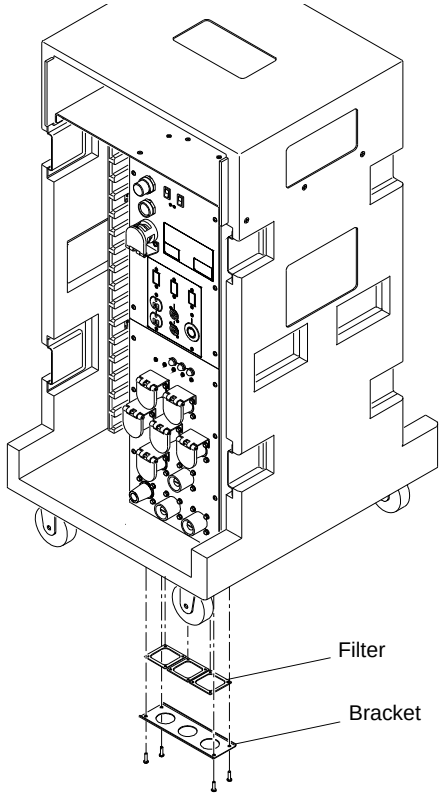


Figure 4-2: Removing Rack Air Filter

Breaker Module Filter

Parts:

40.7154.0001.0 FILTER, FAN

Tools:

Screwdriver

WARNING: Remove power from rack before performing any maintenance procedures.

To clean a Breaker Module air filter:

Step 1. Disconnect power to rack.

Step 2. If required, remove Breaker Module from rack. Refer to "Swapping a Breaker Module" on page 55.

Step 3. Using screwdriver, remove filter as shown.

Step 4. Clean filter with soap and water. Dry thoroughly.

Step 5. Re-install filter.

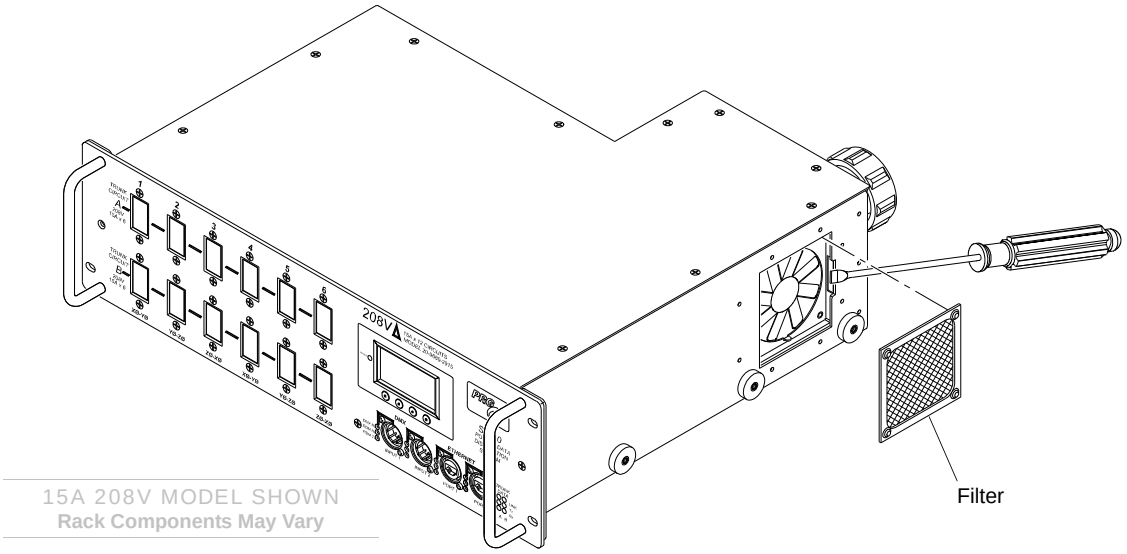


Figure 4-3: Removing Breaker Module Air Filter

Note: The Breaker Module fan is triggered thermostatically and will only turn on if the ambient temperature inside the chassis is too high.

RECONFIGURING COMPONENTS

About Reconfiguring

The rack and other system components are configurable depending on system requirements. For example, the rack can contain various types and quantities of Breaker Modules such as 120V and/or 208V or additional auxiliary equipment. The Front of House Breakout Module can be installed independently or in a rack unit itself.

WARNING: In any configuration, the rack should *never* have any unfilled gaps. Special 1U, 2U and 3U safety covers are available to cover any gaps in the rack tower due to custom configurations.

Swapping a Breaker Module

The Breaker Modules are hot-swappable, allowing the components to be changed quickly even while the system is under operation. In the event a module needs to be swapped or the rack needs to be reconfigured, use the following procedure.

WARNING: Every space in the rack *must* be filled with either a module or a rack spacer cover *at all times*. For spacer cover part numbers, refer to "Accessories" on page 12.

Tools:

#2 Phillips Screwdriver

To replace a Breaker Module:

Step 1. At rear of Breaker Module, disconnect any trunk cables.

Step 2. At front of module, disconnect any data cables.

Step 3. Remove four screws securing module. Using handles, pull module straight out of rack.

Step 4. Install new module and reconnect cabling.

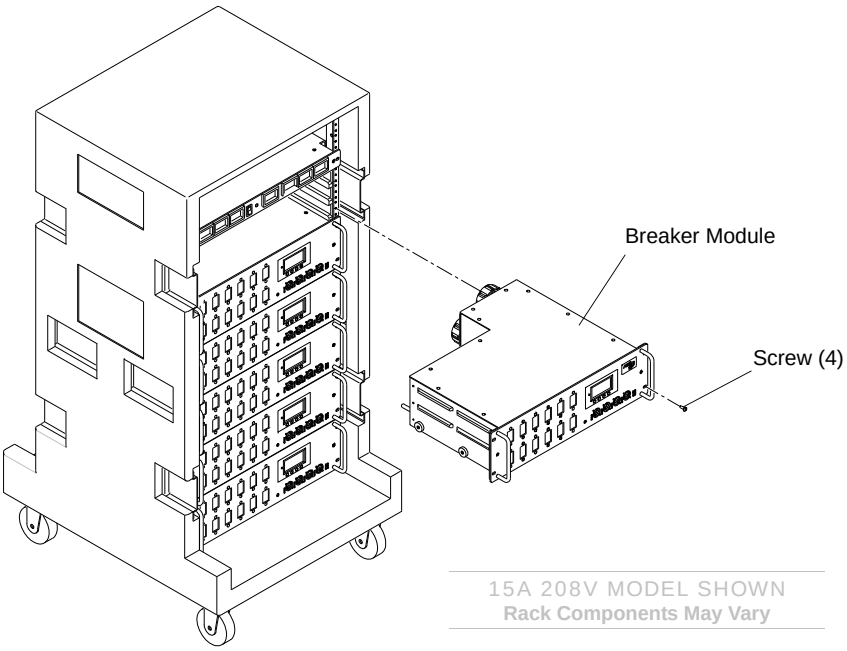


Figure 4-4: Replacing a Breaker Module

Repositioning Front of House Trunk Connector

The trunk connector on the Front of House Breakout Module can be positioned in one of two locations depending on whether the unit is to be installed in a rack or used as a stand-alone enclosure.

Parts:
none

Tools:
#2 Phillips screwdriver

WARNING: Remove power before performing any maintenance procedures.

To reposition FOH trunk connector:

Step 1. Disconnect power from Front of House Breakout Module.

Step 2. At trunk connector mounting plate, remove eight screws and pull connector loose. (Plate will still be connected by wiring.)

Step 3. Rotate mounting plate into new position and re-install screws.

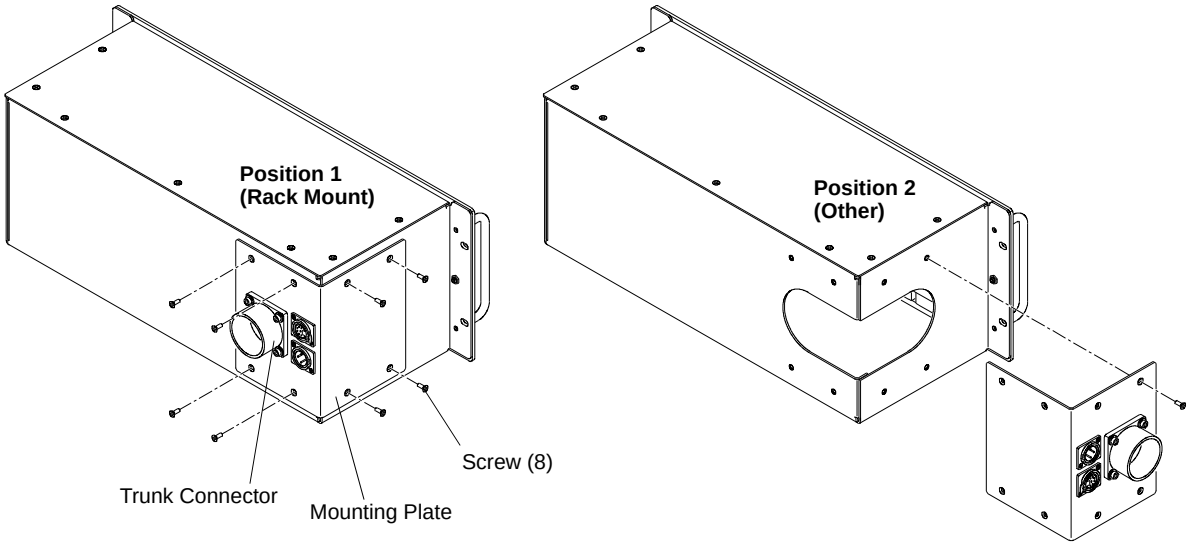


Figure 4-5: Repositioning FOH Breakout Module Trunk Connector

Installing Safety Cover Plates

In the event there are gaps in rack components, an appropriate safety cover plate(s) must be installed to prevent contact with the live bus bars. The size of the safety cover is dependent upon the size of the unused rack space. For example, if there is 3U of empty space, then a 3U cover plate is used. If there is 4U of empty space, then both a 3U and 1U cover would be used.

Parts:

21.9680.0661	ASSY, SAFETY COVER PLATE, 1U
21.9680.0662	ASSY, SAFETY COVER PLATE, 2U
21.9680.0660	ASSY, SAFETY COVER PLATE, 3U

Tools:

#2 Phillips screwdriver

WARNING: Remove power before removing or installing any safety cover plates.

To install a safety cover:

Step 1. Determine which size safety cover plate(s) is required.

Step 2. Fit 1/4-turn fasteners into cover plate, then fit ends of fasteners fit through small, square cut-outs in rack tower as shown.

Step 3. Once cover plate is installed, turn fasteners to secure in place.

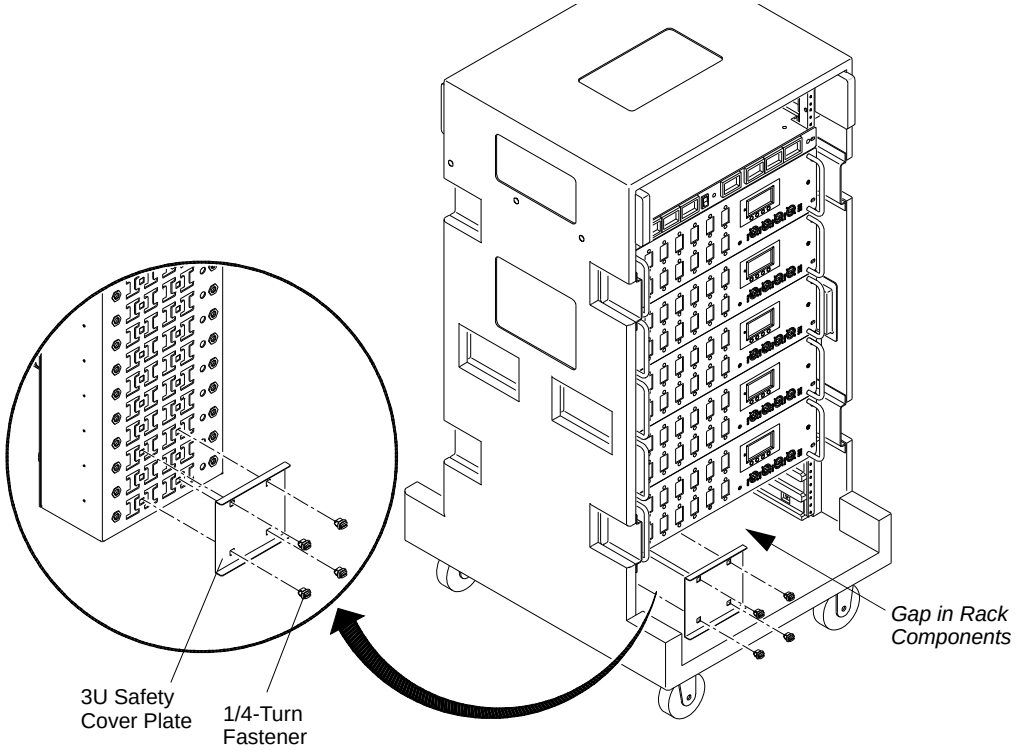


Figure 4-6: Installing a Safety Cover Plate

Notes

PRG Series 400® Power and Data Distribution System User Manual

Version as of: July 6, 2012

PRG part number: 02.9680.0001.31

Production Resource Group, LLC
Dallas Office
8617 Ambassador Row, Suite 120
Dallas, Texas 75247
www.prg.com